

John Cranford,
M. D.



S U P P L E M E N T

TO THE

E L E M E N T S

OF

N A T U R A L H I S T O R Y

AND OF

C H E M I S T R Y.

S U P P L E M E N T

TO THE

E L E M E N T S

O F

N A T U R A L H I S T O R Y

A N D O F

C H E M I S T R Y,

M. DE FOURCROX,

DOCTOR OF THE FACULTY OF MEDICINE AT PARIS,
OF THE ROYAL ACADEMY AT PARIS, &c.

CAREFULLY EXTRACTED FROM THE EDITION OF
1789, AND ADAPTED TO THE ENGLISH;

BY THE TRANSLATOR OF THAT WORK.

L O N D O N:

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— Crawford

A D V E R T I S E M E N T.

THE familiar and perspicuous manner in which M. de Fourcroy has treated the science of Chemistry, in his Elements, which were reprinted, with large additions, in 1786, having caused a speedy consumption of that edition, it was found necessary to publish a third at the beginning of the present year. In this last he has added the new discoveries made since 1786, and altered the whole so as to make it correspond with the new Theory and Nomenclature, which have been received and warmly supported by himself and other eminent French chemists. With the intention of extending the knowledge of that Theory and Nomenclature, he has likewise annexed the two Tables of Synonyma, with explanatory Memoirs, which were formerly published by himself in conjunction with Messrs. de Morveau, Lavoisier, Berthollett, and de Fourcroy.

The English edition of this book, published in 1788, differs, therefore, from the
last

vi A D V E R T I S E M E N T.

last Paris edition in the above particulars. The addition of the new discoveries is obviously necessary to render it complete ; but as the new Theory and its Nomenclature are objects of controversy not yet decided, and most of our chemists adhere to the theory of Stahl, it evidently appeared that the new edition, if translated, would have been less calculated for the English student than that which they already possess. On this account it was thought better to draw out a supplement to the former translation, containing all the alterations and additions, except such as merely relate to Nomenclature. The Translator did not, however, think it proper to leave out the Tables of the new Nomenclature ; because the number of valuable productions which are written after that system, renders it a desirable object for the chemical inquirer to make himself master of its principles, whatever may be his objections to the theory it refers to.

It may, perhaps, be inquired why the present Supplement is not a translation from the French work of Mr. Adet ; and why
the

ADVERTISEMENT. vii

the Tables of Nomenclature are reprinted, since we already possess an English edition of them. On these heads I must observe, that the present Supplement was begun by a careful collation of the two editions before the French Supplement could be procured from Paris; and that, when this came to hand, I found sufficient reasons to proceed with my labour, instead of using that work. It is not necessary, in this place, to say more than that a comparison of the two will shew the propriety of this determination to such as may consider it as an object worth their inquiry.—With regard to the Tables of Nomenclature, it may be observed, that as M. de Fourcroy stood in exactly the same predicament at Paris, in that respect, as I do here, it became incumbent on me to be directed by his motives.

The inducements of common honesty and delicacy naturally prevented my copying the translation of Mr. St. John; but I have compared my translation with his, and find few essential variations, except such as M. de Fourcroy himself has chosen to make.

I do

viii A D V E R T I S E M E N T:

I do not apprehend that any reader will find the least difficulty in understanding the references made in this Supplement to my Translation of the Elements: though I have not tediously swelled it out, by inserting the passages which are altered. Thus it will be seen that I have seldom said, *instead of* * * * * *read* * * * * *, but have simply said, *read* * * * * *; and have continued the new matter until I came to the unaltered text, of which I have usually inserted a few words, with an &c. In these cases all the matter of the text, which lies between the place first referred to and the &c. must be left out. This is indeed sufficiently obvious, and the other references need no explanation.

WILLIAM NICHOLSON.

New North-street,
London, October 6, 1789.

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S U P P L E M E N T

SCHOOL OF MEDICINE
TO THE
E L E M E N T S

OF

N A T U R A L H I S T O R Y

A N D

C H E M I S T R Y.

P A R T I.

A D D I T I O N S A N D A L T E R A T I O N S I N
C H A P T E R I.

Page 5, the following lines are added to the
concluding paragraph.

“ I T proceeds still further ; it appreciates, as
we shall shew in the examination of ve-
getable substances, the re-action of the prin-
ciples upon each other, and determines the
B causes

causes which thus modify, change, and alter those principles”.

P. 8, l. 13.

After the words “each other” the rest of the paragraph is cancelled.

P. 10, l. 30.

The two following sentences, from the words “some readers” to the word “health,” are cancelled.

P. 13, l. 10.

Instead of the words “is not yet universally received,” read, “has not yet been adopted by any chemists.”

P. 14, l. 6.

Instead of “M. Bucquet and myself,” read, “We.”

P. 19, l. 25.

The example of acids and alkalis is left out.

ALTERATION IN CHAPTER II.

P. 42.

INSTEAD of the concluding paragraph of this chapter, the Author has substituted the following:

“ Since the death of that celebrated chemist, the science has gained so much by the new discoveries, that the modern theory daily acquires new accessions of force: the large mass of facts I have collected during the space of twelve years attention to this science, the number of experiments which I have repeated, have convinced me that it is absolutely impossible to avoid admitting this theory; and that such philosophers as continue to support, with more or less heat, the doctrine of phlogiston, all give proofs in their works that they are not perfectly acquainted with the science, or are in some respect deficient in the art of making experiments.”

ADDITIONS AND ALTERATIONS IN CHAPTER III.

IN this Chapter, as well as in most other parts of the work, the Author has substituted the word "attraction" where in the former edition he used the word "affinity."

P. 44.

The effect of attraction upon two globules of water, which is animadverted upon in the note, is not mentioned in the new edition.

P. 45, l. 11.

The words "at a certain distance" are altered to "at the point of contact."

P. 46, l. 15.

After the word "fusion," add, "and cooling."

P. 49, l. 4.

The words "or reduce it to nothing" are struck out.

P. 50, l. 4.

Instead of "filtration" the word "heat" is substituted, and the remainder of the paragraph is thus altered :

"Heat and evaporation produce the same effect upon fluids, as well as upon most solids
which

which are capable of becoming soft or melting. But these last methods, in which heat is the agent which divides bodies, depend themselves upon a chemical attraction of the second kind. The same may be said of dissolution in water."

P. 53, l. 9.

Read, "a little differing."

P. 55, l. 21.

Instead of "minute bodies," read, "the ultimate particles of bodies."

P. 56, l. 11.

The words "infinitely small particles" are omitted.

P. 56, at bottom.

Read, "Among the gases, for example, which of all known substances are those whose aggregation is weakest, there are several whose tendency to combination is so strong, that they unite with the greatest vivacity to almost all natural bodies. Nevertheless, we shall hereafter see that this takes place only when the heat which is combined in elastic fluids, adheres but weakly to its base, and that the aerial force very frequently opposes combination, as is observed in pure air."

P. 57.

The whole paragraph beginning with the
B 3 word

word "lastly," and ending with the words "each other," is left out.

P. 59, l. 10.

Instead of "cannot," read, "can scarcely ever."

P. 60, l. 26.

For "small bodies," read, "the ultimate particles of bodies."

P. 63, l. 5.

For "warmer," read, "colder."

P. 63, l. 3 (from the bottom).

Strike out the word "though," and likewise the six following lines of the paragraph after the word "unite."

P. 66, l. 7.

The paragraph here ends at the word "proof." The introductory sentence next following is left out, and the next paragraph begins thus:

"To shew (1) that bodies which enter into combination lose the properties they before possessed: (2) That they acquire new properties totally different; let us fix our attention upon such properties as, if varied, will affect the senses," &c.

P. 66, l. 25.

Instead of "can by no means be regarded as," read, "certainly is not."

P. 66,

P. 66, l. 4 (from the bottom).

Read as follows: "A few grains of oxygenated muriatic acid diluted in a glass of water, and a few grains of mercury separately given, are not capable, &c."

P. 67, l. 10 (from the bottom).

At the word "acids" the following note is added:

"We are obliged to make use of terms and denominations in this preliminary matter, which are yet unknown to the learner; but the index and the commencement of the articles of the work to which the index refers, may be consulted for the explanation of these words. This is an inconvenience which cannot be avoided in the elements of a science."

P. 68, l. 10 (from the bottom).

Read, "Sulphur and fixed alkalis form livers of sulphur, which are very foetid when moistened."

P. 68, l. 8 (from the bottom).

Read the paragraph as follows:

"We may make the same observation with respect to fusibility. Two substances which are very infusible or very difficult to fuse separately, become very fusible when they are united; the combinations of sulphur and of metals afford very striking examples of this assertion."

P. 70, l. 9 (from the bottom).

Instead of "though it cannot be thence inferred that there is no affinity between them," read, "though it would be false to assert, that there is no mutual attraction between them."

P. 71, l. 2.

After the word "compound," insert, "Bergman devised the name of elective attractions to express that there is a kind of choice between those bodies, which in order to combine together are decomposed or separated from matters before united with them."

P. 73, l. 8.

The sentence, "To avoid this confusion, &c." to the end of the paragraph, is left out.

P. 75, l. 3.

Read, "In some cases there is a certain method of immediately distinguishing an impure from a pure precipitate; it consists in adding a much greater quantity, &c." and proceed as in line 7.

P. 76, l. 4.

The sentence, "As there seems to be," &c. to the end of the paragraph, is left out.

P. 80, l. 8.

Instead of the word "Cornette," the words "Scheele, &c." are inserted.

P. 87, l. 2.

From the words "this objection" to the full stop at "modified" in line 12, are left out, and, instead thereof, the following are substituted :

"A plate of metal which adheres to the surface of mercury cannot be taken up without separating the latter into two strata; so that the weight necessary to raise the plate is employed in overcoming the adhesion of the particles of mercury to each other, rather than in destroying that of the foreign metal with the mercury.

"We may therefore affirm that if the chemical attraction be the same force with the general attraction, the difference of its laws, compared with those of this last, shews that it is a peculiar modification. This truth," &c.

P. 88.

The paragraph beginning "if we might presume" is left out.

ALTERATIONS AND ADDITIONS IN
CHAPTER IV.

P. 91, l. 10.

AFTER the word "substances," insert,
"separately."

P. 95, l. 12.

The remarks numbered 2 and 3, ending at the word "circumstances," are left out. The remark numbered 4 is numbered 2 in the new edition, and the following is added at the end of the paragraph :

" 3. That among natural bodies there is a great number, such as sulphur, and the metals which art has not succeeded in decomposing, and which are simple bodies in the present state of our knowledge."

P. 96.

After line 4, the construction and sense are thus altered:

" It follows, that the true principles or first elements of natural substances escape our senses and our instruments; that many of those which have been called elements, on account of their volume, their influence in the phenomena of nature, and their multiplied existence in its different products, are
very

very far from being simple and unchangeable bodies ; and that probably there is no body which falls under our senses which is simple, but only appears such to us, because we do not possess the means of decomposing it. These assertions moreover agree," &c.

P. 96, l. 9 (from the bottom).

The remainder of the paragraph is struck out, and the following words substituted instead :

“ as containing the principles of which most other natural bodies are formed.”

ALTERATIONS AND ADDITIONS IN CHAPTER V.

P. 100, l. 11.

READ, "this opinion no longer exists among philosophers who cultivate the science of chemistry."

— l. 14.

Read, "theories proposed some years past, respecting fire."

— l. 20.

Read, "we shall consider in succession as so many particular effects of fire, light, heat, rarefaction, the changes produced in bodies by heat, and those which are attributed to combined fire, formerly called phlogiston."

P. 101, l. 12.

Read, "this substance which is thought to be emitted."

P. 101 (last two lines of the text).

Read, "subject to gravitation, is an evidence of its existence as a body itself."

P. 106, l. 10.

Instead of the words "and roots," insert, "&c."

P. 108, l. 1.

For "only," read, "first," and instead of "we propose," &c. at the end of the paragraph, add, "M. Berthollett has likewise attended to
this

this subject, and we shall hereafter see that he has determined what happens in many of these alterations."

P. 109.

Read, "it cannot be proved by weight that heat, &c."

P. 115, l. 6.

For "vapour," read, "heat."

P. 118, l. 12.

After the word "principles," read, "it exists in a state of compression, more or less considerable."

P. 118, last line of the text.

The sentence beginning with "They are of opinion," and ending with the word "occasions," is left out.

P. 120.

The note is left out, and at l. 9 of the text, the subject is continued thus: "Some philosophers think that light and heat are the same substance, and differ only in their state. This body is light, when its particles, collected together, and possessing all their attraction, are projected with great force; it is heat when the same particles, in a state of division, move slowly, and tend to an equilibrium. They think that heat can become light, and light heat;—it cannot, however, be denied that light often produces effects very different from

from heat ; as takes place in the nitric acid, the oxygenated muriatic acid, the metallic calces or oxides, and the leaves of vegetables plunged in water : all these bodies give out vital air, or oxygenous gas, when they are exposed to the rays of the sun, and most of them do not afford it by the action of heat alone. It is in this manner that the artificial light of our fires, passing through the vessels, changes the nature of the products which are disengaged.

Lastly, Mr. Lavoisier and De la Place," &c.

P. 123, l. 1.

The first sentence of the paragraph is thus altered: "Let us here attend to the resemblance which appears to exist, in certain cases, between light and heat, and the differences which distinguish them in the processes of nature and art."

P. 124, l. 18.

For "incalescence," read, "incandescence"

P. 125.

The two last paragraphs are left out, and the following inserted: "Such were the ideas of Macquer and a considerable number of other philosophers ; but more numerous and better observed facts, concerning the difference of heat contained in various bodies, their aptitude to absorb it, the elective attractions it appears to obey, render the opinion of the
existence

existence of heat as a peculiar body, much stronger than ever. It is thought to be often one of the principles of compound substances; that it is the lightest of all natural bodies, and cannot, on that account, be shewn to exist by any indication of weight. Two species of heat are distinguished, or rather heat itself is distinguished in two different states, in all natural substances; one, which is intimately combined, and is called latent heat, or caloric, because it is not sensible, and the other which is simply disseminated. This last appears to be capable of expulsion by simple pressure, or by mechanical means; thus it is that when a bar of iron is hammered, and its particles are brought together by the shock, the heat escapes in the same manner as water flows out of a moistened sponge by pressure. Heat, truly combined, does not quit bodies but in consequence of new chemical combinations. All solid substances which contain these two kinds of heat, are capable of taking up a greater quantity, both of the one and of the other; this superadded heat separates the particles more and more: its first effect is to soften the solid body; its second, in proportion as it is accumulated, consists in fusion, or liquefaction; its third, the quantity being supposed still to be continually increased, is elastic fluidity. But we will treat of these phenomena in the two following paragraphs."

P. 126, l. 8.

Instead of the last ten lines of the first paragraph, read as follows :

“ This rarefaction shews the intromission of some substance into the pores of the rarefied body ; this substance, which is heat itself, acts like wedges or springs, that separate and remove the particles of these bodies from each other ; the bodies themselves, when rarefied by heat, do not acquire weight, and their specific gravity is less considerable than before, because the rarefaction consists simply in a separation of the parts of the heated body, whose pores are then enlarged, so that it contains more void space and less solid matter than before, in a given space : this separation is occasioned by the matter of heat, whose weight with respect to us is nothing.

P. 128, l. 2.

Read, “ it appears to be subject to some exceptions ; ” after which the rest of the paragraph is thus altered : “ In fact, a gentle heat really dilates their fibres, separates them, and diminishes the density of their texture ; but by a sudden and strong heat, parchment, membranes, and tendons shrink and contract ; a property which seems to depend on the irritability, or rather the contractibility of animal fibres, to which heat seems to be a stimulus, as long as their organisation is not destroyed.”

The

The last sentence, "We find even in some," &c. is excluded.

P. 129, l. 18.

After the word "furnace," read, "and not to press too closely such vessels as are luted together; for, without that precaution, it would not be possible to avoid the fractures and inconveniences which their expansion would produce."

P. 131, l. 7.

The four following lines are thus altered: "It may be conceived from what is here exposed, that this general effect depends on the circumstance, that a solid body which becomes liquid absorbs more heat than it before possessed; whereas, in the contrary circumstance, it gives out the quantity of heat which kept it in a state of fusion."

In the following title, read, "Phlogiston of Stahl."

P. 133, l. 20.

After "disengaged," insert, "in the form of fire at liberty."

P. 134, l. 3.

The two following paragraphs are thus altered:

"However brilliant this theory may be, it is easy to conceive that it is subject to a great difficulty; in fact, Stahl and all his followers have not sufficiently specified what the phlo-
C giston

giston is, but have expressed themselves in too vague and obscure a manner. Macquer, who was well aware of this difficulty, after having long meditated on the nature of fire and phlogiston, concluded that light possessed all its properties, whether it be considered as at liberty, in a state of agitation, and possessing all its properties, or whether it be conceived as a principle of bodies tending to quit them by motion.

“ In the explanation of a system admitted in the sciences, it is necessary at the same time to point out its difficulties and shew its errors : we think proper therefore, in this place, to point out the objections which are now made to the doctrine of this great chemist ; a doctrine which has not lost its reputation, till after having constituted one of the most brilliant epochas of chemistry.”

P. 137, l. 3.

Read, “ This however must be understood with some restriction ; for, notwithstanding the immense researches made of late years into the phenomena of combustion, the opinion which admits the existence of fire as a principle fixed in bodies, has not yet been overthrown, and its name of phlogiston has been changed into that of caloric or combined heat. But it is not to this matter that the property of combustibility is attributed. Its presence in inflammable bodies is not that which determines their inflammability.

“ Since the attention of chemists,” &c. and proceed as in line 22.

P. 139, l. 6.

Instead of “ precipitation on,” read, “ combination with.”——Also, line 7 from the bottom, after “ phlogiston,” add, “ by considering this principle as fixed light.”

The two last lines of p. 139, and the first of p. 140, are struck out.

P. 140, l. 12.

Instead of “ perfectly answers,” read, “ appeared to answer.”

P. 140, l. 12 (from the bottom).

The sentence beginning with “ This important position” is left out, and the remainder of the section is thus altered: “ Scheele has proposed a different theory, which has had its adherents among the northern chemists. He supposed that fire, heat, and light, were compounds of vital air and phlogiston; that, by passing through the vessels, it deposited its phlogiston, and the vital air was disengaged as in the reduction of the metallic calces or oxides. But this ingenious theory, by the assistance of which Scheele explained the influence of solar light and heat differently modified, in a great number of chemical phenomena, does not afford the reason of the increase of weight in metals, sulphur, phosphorus, &c. after their combustion.

“ Mr. Lavoisier, whose opinion ought to have as much weight in chemistry as his experiments have had influence on its progress, has offered a new doctrine, which many French chemists have adopted, and which appears to me to explain, the most perfectly of all, the theories the phenomena of nature. He thinks that light, heat, and all the great phenomena which combustible bodies present in their inflammation, depend more upon the air which favours this last process, than on their own proper nature ; that the flame which takes place in this operation, arises rather from the light disengaged from the pure air, than from that which is separated from the combustible body. The decomposition which takes place, according to Stahl and Macquer, in the inflammable substance, is by him attributed to the pure air, which he considers as a compound of the matter of fire and another principle we shall hereafter speak of ; and the fixed fire, whose disengagement produces the principal effect, is, according to him, separated from the pure air rather than from the combustible body. We cannot enter more fully in this place into this ingenious system ; we shall dwell more largely upon it in the history of air, which belongs to the following chapter. We shall content ourselves by observing, that the matter of fire or heat, which Mr. Lavoisier admits in pure air, and whose disengagement is, according to him,

him, the cause of the dazzling flame and strong heat which attend the rapid combustion produced by this air, performs nearly the same office as the phlogiston of Stahl, or the fixed light of Macquer, and that all chemists are agreed concerning its existence; but that they differ in this, that some admit its existence in the combustible bodies, and consider it as the cause of inflammability; others think that it exists in the air, and that it is not the substance which determines the combustibility. We shall in the following chapters explain the reasons which lead us to think, that this last opinion is the most probable."

P. 144, l. 4 (from the bottom).

Read, "ascends, and remains suspended, ^{cr} dissolved, until condensed by cold."

P. 146, last line.

Read, "The oily matter and the charcoal, which are the component parts, decompose a portion of the contained water, and form an acid, elastic fluids, and a brown oil, which did not exist as such in the wood, &c. Every part is therefore changed," &c. as in l. 9, p. 147.

P. 147, l. 16.

Erase the word "salts," and insert the word "acid."

P. 147, line 10 (from the bottom).

Instead of the last sentence of the paragraph, beginning with "and for that reason," read,

“ but the modern discoveries are able to determine the true nature of the principles which constitute these matters, from the consideration of those which are disengaged.”

P. 149.

After the word “ accuracy,” in line 4, the following paragraph is inserted :

“ As these various effects of heat arise from the separation which it produces between the particles, let us again consider this first effect, and endeavour to appreciate its whole influence.”

After which follow the pages xxvii, xxviii, xxix, xxx, and xxxi, of the Preliminary Discourse, beginning with the words “ Water in the form of ice,” and ending with “ the application of a great degree of cold.” The following alterations are made in those selected pages, viz.

At p. xxix, l. 14.

The words “ acetous acid,” &c. are erased, and the subject is continued thus : “ These three fluids are reduced into vapours, and preserve their aerial form, when the barometer stands at 28 inches, and the water possesses the temperature of 80 degrees of Reaumur’s thermometer, spirit of wine 66, and the ether 32.”

P. xxx, l. 17.

After the word “ substances,” add, “ We have sought for an expression which might denote
this

his state of combination in heat; we have adopted the word caloric, because, in fact, when this body is fixed it is no longer heat, but becomes so only when set at liberty. This denomination likewise avoids the periphrases of the matter of heat, or latent heat, which have been the expressions hitherto used. Cooling, or the transition of heat to the state of caloric; heating, or the transition of caloric to the state of heat, depend on the general law we have established;" and proceed as in line 19.

P. 151, paragraph 1.

Read, "The temperature of boiling water, or 212 degrees, is used in decoctions, the extraction of essential oils," &c.

P. 151, l. 3 (from the bottom).

Add, "A similar degree of heat may be excited by a stream of vital air or oxigenous gas thrown upon charcoal, by means of the bellows or blow-pipe. Mr. Monge is of opinion, that by presenting atmospheric air in a state of compression, to combustible bodies in a state of inflammation in the furnace, an effect may be produced similar to that excited by vital air. This process may hereafter be applied to operations in the large way."

P. 152, l. 6.

The account of Mr. Wedgwood's instrument is rectified as follows:

"Mr. Wedgwood has constructed in Eng-
C 4 land.

land a thermometer of this nature ; it is formed of small pieces of clay half an inch in diameter. These pieces, when contracted by heat, advance to a greater or less distance between two rules of copper convergent towards each other upon a plate of the same metal. In this manner by means of a scale drawn upon these rules, the degree of contraction, and consequently of heat, which they have experienced, is ascertained." *Journal de Physique*, 1787.

P. 154, l. 9.

Instead of " principal part of the chemical nomenclature," read, " practical part of chemistry."

P. 154, l. 4 (from the bottom),

Read, " or their salts. Calcareous stones are thus converted into lime," &c.

P. 155, l. 5.

After " baked clay," insert, " of iron and of platina."

P. 157, l. 6 (from the bottom).

Read, " Evaporation is the action of heat upon liquids."

P. 163, l. 11.

M. Black has contrived furnaces which appear proper to produce a regular and uniform heat by means of registers, which are opened or closed at pleasure. We have not received sufficient

sufficient information to enable us to construct the like; but as the art of chemistry cannot but be greatly benefited by this discovery, it is to be hoped that it will be speedily adopted in France*.

* Dr. Black's furnace is described in the Edinburgh New Dispensatory, printed in the year 1786, p. 49, 50.

ALTERATIONS AND ADDITIONS IN CHAPTER VI.

IN this chapter, the air is distinguished by the epithet common or atmospherical.

P. 164, l. 8.

After "atmosphere," insert, "It penetrates likewise and fills the interstices or pores which exist between the integrant parts of bodies."

——l. 10.

For "such air," read, "pure air."

P. 165, l. 10 (from the bottom).

Read, "aeriform fluids or gases."

——l. 5 (from the bottom).

Read, "as most liquid substances do; that is to say, we are unacquainted with the pressure or degree of refrigeration capable of rendering them solid; and this is the character of permanent gases."

P. 172, at the bottom.

Read, "Mr. De Luc and Mr. De Saussure have paid great attention to this important subject for some years past."

P. 174, l. 6 and 7 (from the bottom).

Erase the two lines of the sentence following

ing the word "process," and also the word "almost" in line 5.

P. 175, l. 3 and 4 (from the bottom).

Read, "The same phenomenon takes place with oils, resins," &c.

P. 177, last line.

Erase the words "and exists likewise in the nitrous acid, and in nitre."

P. 178, l. 9.

Read, "But as this denomination may convey a false idea of the nature of this elastic fluid, we shall adopt the name of vital air, because it is the only fluid," &c. as in line 16.

P. 179, l. 8.

For "is," read, "was at first."

P. 181, l. 1.

The sentence included between the brackets is left out.

—l. 6.

Read, "peculiar principle capable of becoming solid, and the matter of heat or fire, to which last it owes its aerial form; that it is decomposed in combustion, its fixed and solid principle uniting with the combustible body, and by that means changing its nature, and adding to its weight, while the matter of fire is disengaged in the form of light and heat."

P. 182,

P. 182, l. 7.

The date is altered to May, 1787.

——l. 10.

Instead of the two remaining sentences of this paragraph, the following is inserted: "The theory we have here exhibited daily acquires new force; the objections of those who do not yet admit it have done it no injury; they even prove that, with a more accurate knowledge of the whole of this theory, the chemists who oppose it would be sensible of the insufficiency of the objections they urge; and that, when this knowledge shall become more extended, all philosophers will be necessarily of one sentiment."

——l. 8 (from the bottom).

Read, "It is a slow combustion, in which part of the heat of the vital air passes into the blood, which circulates through the lungs, and is with it dispersed through all the organs: thus it is that the animal heat is repaired, which is continually carried off by the atmosphere and by surrounding bodies. The maintenance of the heat of the blood is therefore one of the principal uses of respiration; and this happy theory explains why animals which do not respire the air, or which respire it very little, have cold blood.

"Messieurs Lavoisier and De la Place have discovered a second use of air in respiration; namely,

namely, to absorb a principle which exhales from the blood, and appears to be of the same nature as charcoal. This body reduced into vapours combines with the oxigene of the vital air, and forms carbonic acid, which issues out of the lungs by the expiration. This formation of carbonic acid which takes place in atmospheric air respired by animals, at the same time that the mephitic is separated, clearly shews the dangerous consequences which result from too great a number of persons being included in close places, such as theatres, hospitals, &c." as in line 3 from the bottom of page 183.

P. 184, l. 16.

Erase last sentence.

P. 184.

At the end of this chapter is added the following:

"§ 3. Concerning the characters of mephitic, or azotic gas, which forms part of the atmosphere.

"From all the foregoing details it follows, that atmospheric air is composed of two gases, or elastic fluids; the one, which maintains combustion and respiration; and the other, which cannot serve in the production of either of these phenomena. The first, which is called vital air, is in the proportion of 0, 27 or 0, 28; the other amounts to 0, 73, or 0, 72. We have observed that the former is composed
of

of caloric and oxigene; the second is likewise, as all gaseous bodies are, a compound of caloric and of a base capable of becoming solid. This elastic fluid, which forms more than two thirds of the air of the atmosphere, was at first called mephitic by Mr. Lavoisier, because it extinguishes bodies in combustion, and destroys animal life; but as all the gases, except vital and atmospherical air, are equally noxious, and as the name of mephitic is a general expression which belongs to them all alike, and has always been given to elastic fluids, which are not respirable, we have adopted the name of azotic gas for this aeriform fluid; and this denomination has permitted us to give the name azote, or the substantive, to the base of this gas, which, like that of vital air, or oxigene, becomes fixed by combining with various substances. To give in this place some information respecting the nature of this azotic gas, we shall describe some of its properties. It is somewhat lighter than atmospheric air, and occupies the upper part of rooms in which the air is altered by respiration and combustion. Though it is very noxious to animals in its state of elastic fluidity, yet its base, or azote, is one of the component parts of their bodies, from which it is obtained in very great quantities. It is one of the constituent parts of volatile alkali, or ammoniac, and of the nitric acid. It appears to be absorbed by vegetables, and perhaps

haps even by animals. It is likewise very probable that it forms one of the principles of all the alkalis, and that it may be considered as the true alkaligene, opposed to the base of vital air, which, as we have observed, is oxygen. The atmosphere would be then, according to these considerations, an immense reservoir of the acidifying and alkalifying principles, without being itself either acid or alkaline.

“All these properties can be no more than announced in this place; they will be demonstrated and explained much more fully in the other chapters. We have been desirous of shewing the difference which exists merely between the two elastic fluids which constitute the air of the atmosphere, and of fixing the attention on each of them.”

ALTERATIONS AND ADDITIONS IN CHAPTER VII.

P. 185, l. 1.

READ, "The late researches of Messieurs Lavoisier, Meusnier, De la Place, and Monge, have shewn."

—l. 6.

Read, "We shall see below in what manner these philosophers have succeeded in analysing water."

P. 187, l. 10 (from the bottom).

Read, "A heat of some degrees of Reaumur's thermometer is produced in water by the act of freezing, because it is a liquid body which becomes solid. This thermometer, plunged in water which congeals, rises more or less above 0, though another placed in the atmosphere at a temperature cold enough to freeze water, remains constantly at 0, or even beneath it. It follows therefore," &c. as in the last line.

I must here remark, that the passage, even as it is altered by the ingenious author, is not perfectly accurate. It is true, that heat is given out in the act of freezing, as is manifested

tested by the increase of temperature, which takes place upon the congelation of water which has been cooled below the freezing point; but it is not true that the temperature ever rises beyond that point. In fact, the congelation stops, the moment the unfrozen part of the water has arrived at the highest temperature which ice is capable of sustaining without melting; and in the natural process, the congelation is continued by the low temperature of the air and other surrounding bodies, which conduct off the heat.

P. 190, at the end of paragraph No. 5.

Add "and is always owing to the air interposed between their particles; for every substance, singly considered, is more dense and heavy in its state of solidity than when fluid."

P. 191, l. 4.

Read, "Modern chemists think that it absorbs heat in melting, and that this absorption is equal with regard to the quantity of caloric which becomes fixed, and the quantity of heat which is disengaged when it becomes congealed."

P. 195, l. 3 (from the bottom).

Read, "in the state of vapour, or elastic fluid."

P. 196, at the end of paragraph No. 2.

Add, "and consequently to a true precipitation."

P. 196, paragraph No. 3.

Read, "according to Mr. Watt, 800 times the space it possessed in the liquid form."

P. 197, paragraph No. 7.

Doctor Lewis long since determined that the æolipile excites combustion in no other way than by driving a stream of air against the ignited body, together with the steam which escapes out of the engine. For the effect is not produced, if the orifice of the æolipile be inserted through a hole in the side of a furnace, instead of causing the steam to pass through a body of interposed air. See Lewis's Philosophical Commerce of Metals. Remark of the Editor.

P. 202, l. 9 (from the bottom).

Erase "nor the putrid spiritus rector."

P. 204, l. 4.

Read, "It is to several French academicians."

P. 207, l. 4 (from the bottom).

After "inflammable air," insert, "or more accurately 0, 86 of the former, and 0, 14 of the latter of these substances."

P. 208, l. 9 (from the bottom).

The remainder of this chapter is altered as follows :

"We think it proper to make some observations

vations in this place, in order to render this theory more clear and accurate.

“ We have observed, that all aeriform fluids owe their gaseous state to the matter of fire or heat which is united to them. It is the same with inflammable gas. Now, as the decomposition of water, and its conversion into inflammable gas, never take place but at a temperature considerably elevated, and as its rapidity is greater in proportion as the heat is stronger ; we see that this gas does not possess the aeriform state, nor acquire so much levity, but because its base, which partook of the liquidity of the water, absorbs a great quantity of heat ; so that it cannot be obtained but in this state of extreme fusion. It is necessary, therefore, to give a name to this base of inflammable gas, which, when it is combined to that of vital air or oxigene in water, may even become solid, as is conceived in ice. This base, considered as one of the essential principles of water, ought to have a name expressive of this property. We have adopted the word hydrogene, which very well answers the proposed intention : we say, therefore, that water is a compound of the base of vital air, or oxigene, and the base of inflammable gas, or hydrogene ; and as many bodies are inflammable in the state of elastic fluids, such as alcohol, ether, the volatile oils, &c. we distinguish this principle of water in the aeriform state by the words hydrogeous gas.

“ We shall return to this important subject in another chapter. It is sufficient to have shewn in the present, that water is not a simple substance, but is susceptible of decomposition. Nature in the large way effects the disunion of its principles with much more facility, and by a greater number of processes than art possesses. It is by its decomposition that water serves to purify the atmosphere by emitting vital air; that large quantities of inflammable gas are disengaged from stagnant water; that the atmosphere is sometimes so highly charged with it, that the re-establishment of the equilibrium of the electric fluid sets it on fire, and gives rise to fiery meteors; that water contributes to the formation of saline matters, of which pure air is constantly one of the principles. Lastly, this brilliant discovery of the principles of water, its decomposition and recomposition, throws great light on many phænomena of nature, and in particular on the renewal of the atmosphere, the solution of metals, vegetation, fermentation, putrefaction, as we shall fully explain in the several chapters of this work.”

ALTERATIONS AND ADDITIONS IN
CHAPTER VIII.

P. 212, l. 12.

READ, “ 1. Because this earth is not equally pure in all the stones, wherein Macquer and Stahl himself have admitted it ; for example, in quartz, rock crystal, and flints. 2. Because we find all the properties of terrestrial substances in several matters which differ from vitrifiable earth, only in the earthy characters being not in so marked a degree. 3. Because it is not at all proved that vitrifiable earth is the base of all solid matters, and all earths, as some chemists have thought.

This, therefore, is the opinion we think proper to be adopted on this head. Nature presents,” &c. as in the last line.

P. 216, l. 15.

Add, “ which we call barytes.”

P. 217, l. 3.

Read, “ it is called”—and at l. 6, add, “ but the name of filix, derived from that of filiceous earth, which has been given to it, because it exists in all the filiceous stones, is that to which we give the preference.”

—— l. 8.

After “ argillaceous,” read, “ or alumine.”

PART II. SECTION I.

ALTERATIONS AND ADDITIONS IN
CHAPTER III.

P. 269, l. 14.

INSERT, “The number of these stones is much less than Bucquet supposed.”

P. 297, l. 12 (from the bottom).

Erase the words, “but it is not known whether they are formed by fire.”

P. 315.

In a note on ponderous earth, the author remarks, that in this detail he follows the denominations given by Bergman; and that it will be easy to refer the ancient names, whether of the earthy bases or the acids united to them, to the new and methodical denominations given to those bodies in the history of saline matters in the body of the work. Reference is made to the end of the first and second volumes.

He takes notice likewise, that the aerated ponderous earth was found native in England since the death of Bergman, and refers to the extract of Kirwan's Mineralogy, page 336.

PART II. SECTION II.

ALTERATIONS AND ADDITIONS IN
CHAPTER I.

P. 359, l. 15.

AFTER the word “act,” insert, “This salt really acts by a chemical force, since it produces its effect on the insensible skin of dead bodies, as Mr. Poulletier has proved by accurate experiments; and, in general, on all animal substances, which it dissolves. Causticity, therefore, depends,” &c.

P. 362, l. 8.

The remainder of this section, being altered in various places, runs thus: “The valuable experiments of Mr. Lavoisier shew, that several combustible bodies form, by their combustion, acids of a particular nature, according to the substance burned. Combustion, as we have already explained, is nothing more than a combination of the base of vital air with combustible bodies. All bodies which have been completely burned, that is to say, which have combined with oxigene in a sufficient quantity to be saturated, enter into the class of incombustible bodies; or, which is the same thing, their tendency to combine with oxigene being satisfied, they are no longer capable of

D 4

uniting

uniting with or absorbing more. These principles being once proved, if on the one part it be found, that many salts are the residues of various combustible matters which have been burned; and if, on the other part, an entire class of these salts be found to contain oxigene, and to exhibit the characters of substances which have passed through the process of combustion, it will easily be conceived that they cannot continue to be combustible. These assertions are founded on a great number of facts, as will hereafter be seen; they prove that salts are compounded substances, most of them being formed by the union of certain combustible bodies with oxigene. And it will be understood with equal facility, that this character of incombustibility may be considered as the most certain and invariable property of saline matters. The proof of these important assertions will, we hope, appear complete with regard to the class of acid salts, in the details which will constitute the particular history of these substances.

There exists, nevertheless, a class of salts which appear evidently to be compounded, and do not contain oxigene. Such are the alkalis in general: but they are either composed of matters which are themselves incombustible; or, if they contain any combustible substance, as will be shown in ammoniac or volatile alkali, it is united to a substance evidently incombustible, which absolutely prevents this property

property from being sensible in the other substance."

P. 364, l. 8 (from the bottom).

Read, "and it may be strongly presumed by analogy, that most of this class of salts are compounded in the same manner. Water, without being one of the immediate principles of salts, is often united, and adheres to them by a very strong attraction. As to the matter of fire, considered as phlogiston, which very great chemists have admitted in salts, there is too much uncertainty at present respecting the nature, and even the existence, of this matter, to justify the adoption of any decided opinion. It is not the same with caloric, which appears to form one of the principles of salts, or rather to exist in a greater quantity in some than in others; such is the general cause of the fluidity, fusibility, and volatility of a great number of saline matters.

"The presence of earth in most salts is not shown by any direct experiment; it is only known, that all native salts are mixed with a greater or less quantity of various earthy substances. But these do not belong to them; they do not, properly speaking, enter into their composition, but are as it were accessaries. We do not, therefore, at present know any other principles of saline substances except several combustible matters, oxigene, some incombustible substances, and caloric. It is known,

known, that most acids are the residues of burned bodies, and that they can contain different proportions of combustible matter and oxigene, so that they exist in very different states according to the quantity of these constituent matters. Every thing more which has been said, in treatises of chemistry, upon the composition of salts in general, amounts to nothing more than hypotheses, more or less ingenious, but at the same time more or less remote from truth."

P. 366, last paragraph.

Read, "The mineral kingdom, as far as our present knowledge extends, consists of nine genera and eighty-six species of salts, either simple or compound, differing from each other. We shall proceed to examine these in succession."

In a note on this paragraph Mr. Fourcroy remarks, that there are three salino-terrestrial substances, three alkalis, and ten mineral acids; and that these, united to alumine, the three salino-terrestrial bases, and the three alkalis, constitute seventy neutral or compound salts.

ALTERATIONS AND ADDITIONS IN
CHAPTER II.

P. 367.

TO the title of this chapter is annexed a note, observing that the title itself is the general denomination of the first genus of the first order of simple or primitive saline matters.

P. 368, l. 2.

At the foot of the page is the following note :

“ We have already spoken of them in the lithology ; but we did not then consider them but as forming part of the knowledge of natural history.”

P. 370, l. 2.

Insert, “ The action of oxigene and azote on this saline earth is not known ; perhaps it may contain azote, as one of its constituent parts.”

Also, line 6, read, “ feeble green ;” and line 7, after “ violets,” insert, “ and especially to that of mallows or radishes.”

P. 370, last paragraph.

Read, “ Barytes has but a weak action, either

ther in the dry or humid way, on filex and on alumine; it may nevertheless facilitate the fusion of these earths, and it assumes a blue or greenish colour when heated with the latter."

P. 371, l. 3.

After the word "description," insert, "It is probable that it may be more abundant than has been suspected. It was formerly known only in the barytic sulfate or ponderous spar; it has been found a considerable time ago in England, combined with carbonic acid, and crystallized like a transparent spar. We shall describe this salt in future. Some modern chemists suppose it to be a calx or metallic oxide from its weight, and that of the compounds into which it enters, and likewise the precipitate it affords when Prussian alkali is added to its acid solution," &c. as in line 9.

At the end of the paragraph, at the word "composition," insert, "I suspect, as I have before taken notice, that it may contain azote, or the base of mephitis."

P. 377, l. 5.

Read, "These vapours produce a green colour in paper stained with mallows."

P. 379, l. 6.

After "atmosphere," insert, "Hence it is that the cream of lime cannot be formed without the contact of the air."

After

After line 7, insert, "The actions of oxygen and azote upon lime are not known; it seems that this base absorbs and fixes a portion of azotic gas; or, at least, it is probable that it contains the base of that substance."

P. 381, line 11 (from the bottom).

Erase the seven following lines from the semicolon to the full stop.

P. 382, l. 3.

"It seems indeed to be out of doubt, that it is formed by marine animals; that its constituent parts are united and combined in the water during the life of these organic beings; and that azote is one of its constituent parts. But it must be confessed, that this sketch is not yet sufficient for the conviction of modern philosophers, who do not form their opinions decidedly, unless in consequence of repeated and accurate experiments.

"Lime is employed," &c.

P. 383, l. 11.

Read, "The species of alkali which we denote by the name of potash, has been called vegetable fixed alkali, because it is found," &c.

—— l. 19.

Insert, "Formerly, to distinguish this salt from the common fixed alkali, it was called caustic fixed alkali."

P. 385,

P. 385, l. 4.

Insert, "The action of oxigene and of azote upon this alkali is not known."

P. 387, l. 7.

Read, "It is probable that potash is a compound of one of the three preceding earths with azote. Some analogies lead me to believe that it contains lime; but we do not possess a sufficient number of facts to admit this composition as a demonstrative truth."

P. 388, l. 9.

We call it simply by the name soda.

P. 389, l. 22.

Read, "secondary or neutral salts."

—— l. 7 (from the bottom).

Insert, "The same analogies lead me to believe, that this, like the foregoing, is a combination of an earth with azote; and that its characteristic properties depend on the difference of its earthy base. Perhaps this may be magnesia, as I have for several years hinted in my Lectures, and as Mr. Lorgna has since attempted to prove; but the facts are not sufficiently numerous, nor even exact enough, to place this opinion in the rank of demonstrated truths."

—— l. 3 (from the bottom).

Read, "We give the name of ammoniac to
the

the salt known by the name of the volatile alkali."

P. 391, l. 7 (from the bottom).

After "violets," insert, "mallows and radishes."

P. 392, l. 11.

Read, "The cause of this change is not yet well known. It appears only, that the alkali is decomposed in this experiment, and that its two component parts, as we shall presently observe, are separated, and put into the state of elastic fluidity."

P. 394, l. 6.

After "gas," insert, "with a certain quantity of caloric." Also, at the end of the paragraph, insert, "with a certain quantity of caloric."

P. 395.

The note is omitted.

S U P P L E M E N T

T O T H E

E L E M E N T S

O F

N A T U R A L H I S T O R Y

A N D

C H E M I S T R Y.

ADDITIONS AND ALTERATIONS IN
VOLUME II.

THE Author has placed the fourth chapter on Acids at the end of the first volume.

C H A P. IV.

Page 1.

The note is omitted.

E

P. 2,



The rest of the paragraph from the word
“ air” is erased.

— l. 20.

Insert, “The phosphoric acid is likewise found
in this kingdom, united to iron, to lead, and
to lime.”

At the foot of the page insert

“ The molybdic acid.

The tungstic acid.

The arsenic acid.

And The succinic acid.

We shall here treat of the six first, which
are in general the best known and most abun-
dant ; the four others shall be treated of else-
where.”

P. 3, l. 2.

Read, “ We give the name of carbonic acid
to a very abundant acid, which being often
found in the aeriform state, was originally
called fixed air,” &c.

— l. 6.

After the word “ Bergman,” the paragraph
concludes in this manner: “ and cretaceous
acid by Bucquet.” We shall presently explain
the reason and the utility of the denomination
we have adopted.

P. 3, l. 14.

The sentence respecting the name of cretaceous acid is omitted.

——l. 3 (from the bottom).

After “acid” insert the word “gas,” and after the word “part” in the last line insert, “Like air, it is invisible and elastic; it cannot be distinguished from this fluid when inclosed in a glass vessel, or when it floats in the air.”

P. 7, l. 8 (from the bottom).

Erase the word “fixed.”

P. 8, at the bottom.

Add, “which was formerly called concrete volatile alkali, English salt,” &c.

P. 9, l. 10 (from the bottom).

After the words “pure air,” read, “But the discovery of the nature and decomposition of water has shewn the improbability of this hypothesis, and Mr. Lavoisier has substituted a demonstrated truth in its stead. This chemist,” &c. as in line 6 from the bottom.

P. 12, l. 17.

Add, “in France. Besides which, this effect is contrary to the discoveries of Scheele and Bergman upon the stone of the bladder, as we shall elsewhere observe.”

P. 12, at the end.

The Author has here inserted his observations on the cretaceous acid from the Preliminary Discourse, vol. 1, page xlvi. to xlix. with the following variations.

The paragraph begins thus: "It is to the first discovery of this acid by Dr. Black that we must fix one of the most brilliant epochas of chemistry. To determine the influence of this discovery on the science, we shall here offer the following remarks."

The note at foot of page xlvii. is left out.

P. xlix, l. 4.

Insert, "These new facts will be exposed more at length in the other chapters of our work."

P. 14, l. 4.

Read, "over mercury, at the pressure and temperature of the atmosphere."

P. 15, l. 6.

Insert, "It is asserted, that, by strongly agitating the liquid muriatic acid with vital air, a portion of the latter is absorbed."

P. 16, l. 18.

Erase the words "as Mr. Lavoisier supposes," and insert, "as we have already explained elsewhere"

P. 17, l. 10.

Insert, "As its acidifiable base is unknown, it cannot be determined whether two states exist with respect to the saturation of this base, by oxigene: the first in which the base would be saturated, and the acid the strongest; the second in which there should not be the same quantity of oxigene, and the acid should be weaker, as we have observed with respect to the sulphuric and sulphureous, the nitric and the nitrous acids. The presence of oxigene has not even been demonstrated in the muriatic acid; and it is only by the force of analogy that we are led to admit its existence in this acid.

P. 18, l. 8.

Read, "vessels containing water plunged in ice."

P. 18, l. 3 (from the bottom).

After the word "salt," read, "which depends on the disengagement of the gas of the oxigene, which saturated the acid."

P. 19, after l. 9.

Insert, "Lastly, the oxygenated muriatic acid changes the metals into calces, and dissolves them without effervescence; it passes to the state of ordinary muriatic acid, by destroying vegetable colours."

—— after l. 18.

Insert, "He has lately discovered, March 1787, that the oxygenated muriatic gas, re-

ceived in a solution of caustic potash, forms a neutral crystallizable salt, which detonates upon charcoal like nitre, and even more strongly, which affords very pure vital air, or oxygenous gas, by the action of fire, and leaves after these two essays the muriate of potash. These experiments prove more and more the theory which I first explained seven years ago, of the nature of the oxygenated muriatic acid; since the detonation of the muriate of potash is manifestly owing to the superabundant oxygen. Soda forms only a deliquescent salt with the oxygenated muriatic acid."

P. 20, l. 8.

Read, " any considerable use."

—— l. 13.

Add, " He has lately proposed it to be used in bleaching cloths and thread; and the first trials made at Paris, on a scale of considerable magnitude, promise to be successful. It may likewise be used for speedily bleaching yellow wax, and particularly the green wax of our islands."

P. 21, l. 5.

Read, " A peculiar phenomenon attends their combination, when the acid has been extracted in glass vessels, namely," &c.

—— l. 20.

Add, " Though the fluor acid gas, in its union with water, deposits a great quantity of siliceous

aceous earth, it still retains a somewhat considerable portion which is precipitated by alkalis."

P. 21, line last but one.

Add, " But as water does not entirely separate it, we see that the liquid fluor acid can act on the earthy part of glass, and upon siliceous stones."

P. 22, l. 12.

Read, " But Scheele has unanswerably confuted this opinion, and considers it as a peculiar acid."

—— l. 18.

Read, " Bergman and Scheele."

P. 25, l. 11 (from the bottom).

Read, " This coloration is accompanied with a disengagement of vital air. Heat volatilizes the acid of nitre, and separates the coloured part in the form of red vapours.

" The red acid unites with great violence to water," &c. as in line 9 from the bottom.

P. 26, l. 8.

Read, " and emits only a white fume."

—— l. 16.

Insert, " We call the white or colourless acid the nitric acid, and that which is coloured, we call the nitrous acid."

P. 27, l. 8.

Read, " It must be observed, that the red

heat of the vessels separates some red vapours from the palest nitrous acid, and changes the colour of the acid itself, which becomes reddish. But," &c.

P. 27, l. 16.

Add, " The same thing happens when water is added to highly coloured nitrous acid: a red vapour is disengaged into the air; the heat which this combination produces, colours this acid already weakened, and converts it from the nitric to the nitrous state. When heat, assisted by light, produces this change in the nitric acid, there is a disengagement of a certain quantity of vital air or oxygenous gas, proportioned to the nitrous gas which is formed. It is in consequence of the attraction which exists between light, caloric, and oxygen, that this decomposition of the nitric acid, and its change into nitrous acid, take place. The effect of the red heat of our vessels imitates that of the solar rays.

P. 31, l. 4, 5, 6.

Read, " Light disengages oxygenous gas or vital air. Heat decomposes the oxygenated muriatic acid."

P. 37, l. 11, to 16.

Read, " We shall shortly see that this is not the true cause of the phenomenon."

P. 37, l. 17, to the end of the paragraph.

Read, " The portion of gas which remains after the mixture of vital air and nitrous gas,
formed

formed likewise an objection against Mr. Lavoisier's theory; and though this residue was very inconsiderable in his experiment, seven parts and one third of nitrous gas, with four parts of vital air, having left only the thirty-fourth part of their whole bulk, yet it was embarrassing to discover the reason. It is true, that Mr. Lavoisier has since ascertained, that the residue is much smaller when the materials are very pure and accurately proportioned to each other; and we shall proceed to shew that it is possible to make a combination of vital air and nitrous gas, sufficiently pure to leave no residue."

P. 40, l. 13.

After "phenomena," insert, "1st, We may conceive, that in this acid the azotic gas and vital air are deprived of much caloric; and, consequently, that they are in the state of azote and oxigene. 2dly, That when it is decomposed by a combustible body, the nitrous gas, which is disengaged, does not require so much caloric to convert it into the elastic form, as vital air and azotic gas do. 3dly, That these two elastic fluids cannot combine in their gaseous state. 4thly, That, consequently, the vital air, obtained from nitrous preparations strongly heated, such as red precipitate, the nitrate of lead, common nitre, &c. must contain a portion of mephitic, or azotic gas, and that it is this gas which forms the residue

due after the union of vital air and nitrous gas; a residue which does not exist when vital air is used, which has been disengaged from the leaves of vegetables, or from manganese. 5thly, That the same thing sometimes happens with the nitrous gas, which may contain a portion of azotic gas or disengaged mephitic; that this must happen when the gas is prepared with bodies, which, being very greedy of oxigene, take it almost entirely from the nitric acid, such as iron, the oils, &c. 6thly, That the nitrous acid which is coloured, and contains an excess of nitrous gas, or azote, or the base of mephitic, is in a very different state from that whose two principles are in a state of saturation; and that, by reason of their different properties, it is necessary to distinguish them by particular names. We name the pale acid, which is the scarcest and most pure, the nitric acid, to conform to the other denominations; and its neutral salts we call nitrates. We give the name of nitrous acid to that which is red, and that of nitrites to its saline combinations. It is true that we seldom have occasion to speak of these last; for, though the nitrous acid, or that which is red and fuming, is more common than the pale, it seldom happens that it remains such in its combination with the alkaline bases; the excess of nitrous gas escapes during the combination, and the nitric or pure acid only enters into the compound. We shall

shall see that these salts, called nitrites, which contain the acid, with excess of nitrous gas, are not formed, except by the action of heat upon the true nitrates."

P. 41, l. 11 (from the bottom).

Add, "its extraction and nature require, therefore, that, in a methodical and regular nomenclature, it should be called the sulphuric acid.

"When it is well concentrated, it has been very improperly called oil of vitriol, on account of its consistence."

P. 41, last line.

Erase the words "which would afford a strong confirmation of the doctrine of Stahl."

P. 44, l. 11 (from the bottom).

After "emitted," insert, "The noise produced during this union, arises from the escape of the air contained in the water, which is seen to escape in the form of small bubbles."

P. 47, l. 2.

Insert, "Though it has been considered as one of the permanent gases, it appears to be capable of condensation to the liquid state, by a great degree of cold. Mr. Monge has succeeded in rendering it liquid by this process."

P. 48,

P. 48, l. 8 (from the bottom).

Insert, " That which here happens slowly, takes place very rapidly in the combustion of sulphur, during which this combustible body absorbs the oxigene of the atmosphere, and becomes more and more acid, until its complete saturation."

P. 51, l. 12.

Instead of the last sentence of the paragraph, read, " It has since been named the acid of borax ; we prefer the name of the boracic acid, in order to give this word the termination of all the other acids."

——after l. 14.

Insert, " As these two acids are combinations of sulphur and oxigene in different proportions, their names ought to have an analogy with their nature ; those of sulphuric and sulphureous acid appeared to me to be well adapted : the termination of this last word expresses the excess of the combustible base, as in the other acids."

P. 52, l. 19.

Read, " and also those of turnsole, mallows, radishes," &c.

P. 56, l. 2.

Add, " As they differ much from the salts formed by the other acids hitherto examined, they prove still more evidently, that this acid
is

is of a peculiar nature, whose principles are not yet known."

P. 56, l. 6.

After "narcotic," insert, "He called it sedative salt, or volatile narcotic salt of vitriol, because he had obtained it by sublimation of a mixture of nitre and vitriol."

ALTERATIONS AND ADDITIONS IN CHAPTER V.

Page 58, line 2.

READ, "from the name of their base, which is adopted by the moderns."

—— 1. last but one.

"We call them barytical salts."

P. 59, l. 9 (from the bottom).

Add, "As we have not hitherto examined any but the six principal acids, we shall treat only of the neutral saline combinations of these."

P. 59, at the end.

The Author has added the following paragraph:

"To denote all these salts, we shall adopt names composed of the acids and their bases, in order that this nomenclature may express the nature of each, and that there may no longer be any error on this point; we shall be careful to join a table, to exhibit the different names which each neutral salt has received at different times."

P. 67, after l. 5.

Read, "The sulphureous, or sulphuric acid with excess of sulphur, united to vegetable alkali,

kali, forms a salt somewhat different from the preceding, which Stahl called sulphureous salt, and which we shall name sulphite of potash. This salt crystallizes in polyhedrons with ten faces, or in two tetrahedral pyramids, truncated at their bases. It is very bitter, very soluble, and slightly deliquescent: almost all the mineral acids, and several vegetable acids, disengage the sulphureous acid in the form of gas, with effervescence. When exposed to the air, the sulphite of potash gradually absorbs oxigene, and becomes sulphate of potash."

P. 67, l. 11 (from the bottom).

Insert, "Its crystals likewise vary in size from that of very fine prisms or small needles, to that of large prisms, near an inch in diameter, and six or eight inches in length, which are obtained in crystallizations in the large way."

P. 75, l. 6 (from the bottom), and the following lines.

Read, "Instead of obtaining the pure acid, a large quantity of aeriform fluid is disengaged, which may be collected over water, and is found to be true vital air mixed with azotic gas. The alkaline residue usually causes the retort to melt very speedily, and the operation cannot be completed but in a stone-ware retort, of very refractory composition. Here we see the nitric acid entirely decomposed
into

into vital air and azotic gas, by means of the heat, which alone separates the two principles. If the heat be not urged so as entirely to decompose the nitre, the alkali will remain charged with a certain quantity of nitrous acid, or nitric acid with excess of nitrous gas; this acid may be disengaged by means of vinegar: the salt, in this state, is what we call nitrite of potash, by reason of the state of the nitrous acid surcharged with azote; in the same manner as we call sulphite of potash the combination of the sulphureous acid with this alkali. If the nitrate of potash be more strongly heated, the alkali remains pure and caustic."

P. 81, l. 5 (from the bottom of the text).

Read, "does not afford nitrous acid, but vital air mixed with azotic gas."

P. 82, l. 7.

Erase the two lines expressing Mr. Baume's opinion, and in the following line 10 read, "distillers of aqua fortis at Paris."

P. 83, after l. 9.

Add, "though he was of opinion, that the decomposition of this salt was owing to a portion of that acid contained in clays."

P. 87, l. 5.

After the word "fuming," insert, "in consequence of the disengagement of a portion of vital air."

P. 88,

P. 88, l. 9 (from the bottom).

Read, "vital air mixed with azotic gas."

P. 106, l. 7.

The remainder of this paragraph is altered as follows :

"Some chemists have thought that litharge is capable of decomposing the muriate of soda in the cold, and by simple maceration : it appeared, that, by uniting the two properties, the first of containing carbonic acid capable of attracting the soda, and the second of forming an insoluble salt with the muriatic acid, which would therefore be easily separated from the alkaline lixivium, the litharge might act by a double affinity ; but my trials on this head have proved that the process is insufficient. Scheele found that iron, plunged in a solution of muriate of soda, became covered with soda, saturated with carbonic acid. He had the same success with the sulphate and nitrate of soda, or Glauber's salt, and rhomboidal nitre, treated in the same manner. He discovered, that quicklime, mixed with a solution of muriate of soda, and left in a moist cellar, afforded an efflorescence of soda, and that calcareous muriate was formed. Cohausen announced this fact, in the year 1717. Mr. De Morveau has proved that these decompositions are effected by favour of the carbonic acid ; because a solution of the sulphate and muriate of potash, poured

F

into

into lime-water, rendered turbid by the carbonic acid, became clear and transparent ; and because there is no precipitate afforded by pouring water impregnated with carbonic acid into a mixture of lime-water, and a solution of these salts."

P. 108, in addition to the Translator's note.

Reference may be made to the Philosophical Transactions, vol. lxxvii. numbers 28 and 29 ; and also vol. lxxix. p. 96, for full accounts of the place and manner of its production.

P. 110, l. 10.

Insert, " This fact, though announced near ten years ago, has not since been confirmed."

P. 111, l. 3.

The Author has inserted an addition of six lines, to the same effect as the note at the foot of the page ; and at the same time observes, that the name of borax is retained to this substance, to distinguish it from the true borate of soda, which is saturated with the acid.

P. 112, l. 15.

Add, " and perhaps, likewise, on the different proportions of the acid of borax and soda, which enter into its composition."

P. 130, l. 14.

The whole paragraph, to line 12 on the following page, is left out.

P. 131,

P. 131, after l. 18.

Add, " We have seen that litharge, proposed by some chemists to produce this effect, does not well decompose the salt; that Scheele has discovered a more evident decomposition of the muriate of soda, by lime and iron, with the assistance of the contact of the atmosphere, and the carbonic acid it contains. We see, that a proportion of this acid, greater than that which commonly exists in the atmosphere, must favour this decomposition, by acting upon the soda by its attraction."

ALTERATIONS AND ADDITIONS IN
CHAPTER VI.

P. 132, after line 8 (from the bottom).

INSERT, "This, like every other crystallization, appears to depend upon the manner in which the crystalline laminæ deposit themselves, whether on their broadest sides, their edges, or their angles.

P. 133, l. 16.

Read, "filiceous earths."

—— line the last.

Read, "separate part of the."

P. 148, l. 8 (from the bottom).

After the word "spread," insert, "or by combining the carbonic acid gas and the ammoniacal or alkaline gas, directly over mercury; the two gases penetrate each other immediately, much heat is excited, and a concrete salt is formed on the sides of the glass vessel wherein the mixture is made. In all these cases," &c.

ALTERATIONS AND ADDITIONS IN
CHAPTER VII.

P. 158, l. 13.

AFTER "felenite," read, "If a solution of barytes be poured into water, loaded with this salt, striæ of barytical sulphate or ponderous spar are formed."

—— l. 20.

Add, "more especially by their solubility in a large quantity of water."

P. 160, the paragraph following l. 20 is thus altered :

"Calcareous sulphate, or felenite, is decomposed by a great number of combustible matters, by the assistance of heat. The charcoal of vegetable substances deprives the sulphuric acid of the oxigene, to which it has a greater affinity than sulphur has. Carbonic acid is disengaged in this decomposition, and the sulphur, separated from the sulphuric acid, unites to the lime, and forms the substance called calcareous hepar; but which we shall hereafter distinguish by the name of sulphure of lime."

P. 163, the two last lines.

Read, "vital air is obtained; and, towards the end, azotic gas."

P. 165, l. 13 (from the bottom).

Instead of the last sentence of the paragraph, read, "This effect depends either on a small quantity of magnesia, or the avidity of the calcareous nitre for water, which it takes from the lime."

P. 169, l. 11 (from the bottom).

Add, "Sometimes, when the crystallization not taken place, and the bottle is agitated, the mass suddenly becomes solid throughout, much heat being at the same time disengaged."

P. 172, l. 3.

The sentence respecting Mr. Chambon is omitted.

— l. 12.

Add, "I have collected together all that experience has already taught us concerning the virtues of this saline solvent, in a memoir, inserted among those of the Royal Society of Medicine, for the years 1782 and 1783."

P. 173, l. 5 (from the bottom).

Add, "cubic, because it always has that form; and, lastly, phosphoric, because, when heated and carried into the dark, it appears luminous."

P. 184.

P. 184.

The second note, concerning nomenclature, is omitted.

P. 185, l. 16.

Insert, " There likewise exist among the fossil remains of marine animals, bodies whose form and organization cannot, in any respect, be referred to any known inhabitant of the sea. Though we do not yet possess any complete treatise upon fossil animals, and though this part of natural history has not been treated with the same care and precision as mineralogy, the description of a considerable number of these bodies is sufficient to prove, that animals have existed in the sea whose species have been destroyed."

P. 194, l. 4 (from the bottom of the text),

This paragraph is altered as follows :

" As the chemical properties depend on the combination or principles of bodies, it is necessary to give them names expressive of their nature ; from this consideration, the several calcareous substances we have treated of must be chemically treated of under the denomination of calcareous carbonate. It is upon the most transparent calcareous spar, or pure white marble, that the experiments must be made, which establish the properties of this earthy substance."

P. 200, l. 9 (from the bottom).

Insert, "the receiver being kept cool with wet cloths, or by a small stream of cold water, which runs on it during the whole operation."

ALTERATIONS AND ADDITIONS IN
CHAPTER VIII.

P. 205, l. 7.

ADD, "The decomposition by volatile alkali is partial; for this substance remains partly united to the acids, at the same time as the magnesia and other parts form ammoniaco-magnesian salts."

— l. 8.

Read, "We shall examine six of these salts in the present chapter, namely," &c.

P. 209, l. 15.

Read, "But this is an error; for the salt, which crystallizes in this operation, is a true triple salt, or ammoniaco-magnesian sulphate, as I am assured by experience."

P. 210, l. 6 (from the bottom).

Add, "but it is always accompanied with muriate of magnesia."

P. 211, l. 14.

Read, "But the same chemist having observed, that fresh lime-water precipitates pure calcareous nitre, when the water of solution is not sufficient in quantity, the magnesia obtained

tained by this process will not possess the degree of purity requisite for a medicine of such utility, if the precipitation be effected on mother waters which are not diluted with a very large quantity of fluid."

P. 216, l. 8 (from the bottom).

Add, "The volatile alkali does not decompose it completely, but forms a triple crystallizable muriatic salt, with the remaining portion of magnesian muriate."

P. 217, at the bottom.

Add, "It is very probable, that the precipitated crystals are not pure, but belong to the class of triple salts."

P. 230, l. 5.

Add, "Hence we see the necessity of distinguishing this earthy base of alum, by the particular name of alumine; because clay, however pure it may be, always contains silica."

P. 231, l. 16.

The paragraph No. 5 ends with the word "Paris," and the paragraph No. 6 begins thus: "Alum may likewise be extracted from efflorescent shifts, and volcanic products. I have extracted a considerable quantity," &c.

—— l. 8 (from the bottom),

Erase the figure 6.

P. 236.

The note at bottom is omitted.

—— l. 7.

Read, “ common clay.”

—— l. 20.

Insert, “ Mr. Le Blanc likewise obtained these cubical crystals at pleasure.”

ALTER-

ALTERATIONS AND ADDITIONS IN
CHAPTER X.

P. 249, l. 8 (from the bottom).

CANCEL the rest of the paragraph, and insert the following:

“ To these six salts must be added the combinations of barytes, with the tungstenic, arsenical, molybdic, and succinic acids; but these being much less known, will be treated of in the history of these four acids.

P. 257, at the bottom of the text.

Add, “ Phosphoric cakes are prepared of this substance, and the ponderous earth is extracted for chemical experiments.”

ALTERATION IN CHAPTER XI.

P. 262.

THE eleventh chapter is omitted in this place, and its materials are applied to the composition of two chapters, which come in between chapters VII. and VIII. page 451 of the present volume; at which place we shall attend to them. — The following chapter is numbered XI.

ALTERATIONS AND ADDITIONS IN
CHAPTER XII.

(Numbered XI. in the new edition.)

P. 282.

THE table of the six genera of neutral salts is drawn out according to the new nomenclature, with the ancient names annexed. In other respects it does not essentially differ from the table in the present edition.

P. 282.

Species VI. of the first genus was by mistake omitted. It consists of "marine acid and fixed mineral alkali, common salt, or rather muriate of soda."

P. 287, l. 5.

At the word "salts," the following note is annexed:

"I do not here speak of the modifications of these salts, called sulphites, nitrates, oxigenated muriates, &c. nor of the twenty-eight species formed by the metallic and bituminous salts, which would make the number of neutral salts much more considerable; besides which, these salts do not appear to exist in nature."

P. 288,

P. 288, at the bottom.

The Author takes notice that the carbonate of barytes, most commonly called aerated ponderous earth by us, has been discovered in England perfectly crystallized, and in large masses.

ALTER*

ALTERATION IN CHAPTER XIII.

(Numbered XII. in the new edition.)

P. 289, l. 13 (from the bottom).

INSTEAD of "peculiar properties," read,
"general properties."

ALTERATION IN CHAPTER XIV.

(Numbered XII. in the new edition, by mistake, instead of XIII.)

P. 312, l. 3.

READ, "because the latter, though it disengages a small quantity of volatile alkali from ammoniacal salts in the humid way, does not decompose them by distillation."

SECTION III.

ALTERATIONS AND ADDITIONS IN
CHAPTER I.

P. 326, l. 8 (from the bottom).

AFTER the word "effected," insert, "It takes place only in proportion as the oxigene loses the caloric which maintained its aerial state."

P. 327, l. 19.

Add, "The strict and accurate form which the modern doctrine has for some years acquired, does not either require, or even permit, our having recourse to complicated and forced theories : by referring to it in this place, we only add to the perspicuity and clearness of our enunciation."

The two following lines are left out, and the paragraph begins with the words "Vital air is composed of a fixable base, called the oxigenous principle."

P. 328, l. 1.

Read, "this theory does not seem to reject."

— l. 12 (from the bottom).

The following is added: "Nevertheless, there is a great difference between the two theories;

theories; the latter (which we admit) possesses all the characters of accuracy and truth; it is founded on the addition and subtraction of weight, which could never be done in the doctrine of Stahl."

P. 329, l. 14.

Add, "or when the igneous principle fixed in a body, and deprived of caloric, passes tacitly from that body to another."

P. 330, l. 11.

The words, from "energy" to the full stop, are erased, and the following sentence proceeds thus: "But this doctrine does not, &c. neither does it explain, at least in the way of experiment, how certain bodies," &c.

P. 331, l. 7.

Instead of "we can scarcely avoid thinking," &c. read, "It is sufficient that it is almost demonstrated that the light is contained rather in the vital air than in the combustible body."

ALTERATION IN CHAPTER II.

P. 333, l. 11.

READ, "dug out of the earth."

ALTERATIONS AND ADDITIONS IN
CHAPTER III.

P. 344, l. 14 (from the bottom).

READ, "one of its characteristic properties is," &c.

P. 346, l. 7 (from the bottom).

Insert, "for it is easy to conceive, from all that we have already shewn, that the caloric and the light are disengaged from vital air and hydrogenous gas during their combustion: it is to this disengagement that we must attribute the weight of the water, compared with that of the oxygenous and hydrogenous gas; this fluid is specifically heavier than hydrogenous gas, as 11050 to 1, supposing that of the gas to be as 13 to 1, compared with common air: the ratio will be much greater if we assume the levity of the hydrogenous gas as 16, which appears to be the case when it is perfectly pure."

P. 347, after line 12 (from the bottom).

Insert, "The proportion of the component parts of water, according to the most accurate experiments, is 85 parts of oxygen, or the base of vital air, and 15 of hydrogen, or the base of inflammable air, both by weight."

P. 347.

Read the last paragraph thus: "With respect to the first question, chemists are at present nearly agreed concerning the identity of inflammable gas, obtained from very different substances, which appear to possess various properties."

P. 348.

Instead of the first three lines, read, "There are indeed some who still are of opinion, that several species really exist; such, according to them, are the inflammable air obtained from iron and zinc by water, which burns," &c. as in line 6 to 15; after which, the rest of the paragraph, ending with the words "other bodies," upon page 349, is thus altered: "But an accurate analysis has shewn, that these two last are compounds of pure detonating inflammable gas, with the azotic gas, or carbonic acid, in different proportions; and we were inclined to think, with the illustrious Macquer, in 1782, that there is only one substance of this kind capable of various modifications by its combinations with different matters. The labours of a great number of celebrated philosophers, and in particular of Messrs. Cavendish, Priestley, Watt, Kirwan, Lavoisier, Monge, Berthollett, De Morveau, &c. have confirmed this opinion. The mixtures of the foreign gases before pointed out, the dissolution of charcoal, of sulphur, and of phosphorus

phosphorus in hydrogenous gas, whose specific gravity they augment while they diminish its combustibility, announce that the apparent differences of inflammable gases are owing to these mixtures or combinations. I think, therefore, that it may at present be considered as demonstrated, that there is but one single species of inflammable gas always arising from the decomposition of water, forming it again by its union with vital air; and, in a word, that there exists in this genus hydrogenous gas only, which exhibits more or less inflammability, and various colours in its combustion, accordingly as it is mixed or combined with other different substances.

P. 350, l. 15.

Read, "as well as some other similar experiments, which several philosophers have opposed to our doctrine."

P. 350, l. 9 (from the bottom).

Read, "However this may be, we shall here admit that it would be possible to explain the phenomena of chemistry by admitting hydrogen for phlogiston; but we must at the same time observe, that this theory of phlogiston requires forced suppositions, and that it is very far from appearing as simple, as satisfactory, as that which we have adopted as the immediate result of the facts.*"

* Consult the translation of Mr. Kirwan's work, and the notes we have added.—Note of the author.

No chemist has yet succeeded in separating the principles of inflammable gas, and consequently it is a simple substance," &c. as in line 7, page 351.

P. 352, l. 8.

Add, " which circumstance has caused it to be considered as the calx or oxide of a peculiar metal still unknown."

ALTERATIONS AND ADDITIONS IN
CHAPTER IV.

P. 356 (at the bottom of the text).

ADD, " by Mr. Deyeux."

P. 363, l. 2.

Read, " than with sulphur."

P. 367, l. 1.

Insert, " I have seen a preparation of this nature which has been made fifteen years; it still preserves much of its colour and smell, and affords an abundant precipitation by acids. Calcareous liver of sulphur," &c.

P. 371, l. 12.

Erase the full stop; and in line 13, after the words " Mr. Proust," add a full stop, and insert, instead of the four following lines, " The oxygenated muriatic acid, poured in a large quantity upon a solution of alkaline liver of sulphur, precipitates little or nothing, because it re-dissolves the sulphur by virtue of its oxygenous principle, which, being nearly at liberty, unites quickly to this combustible body, and converts it into the sulphuric acid. This fact may be shewn, in the most convincing manner, from an experiment I have made, of pouring into it a mixture of barytic muriate,

riate, or combination of ponderous earth with marine acid, which produces an abundant precipitate of the fulphate of barytes, or ponderous earth combined with vitriolic acid."

P. 375, l. 1.

Instead of "because," &c. read, "but the sulphureous or volatile vitriolic acid separates its sulphur, because its oxigene, being partly at liberty, seizes more readily upon the hydrogen of the gas."

P. 375, l. 10 (from the bottom).

The rest of the sentence, after the word "distilled," is left out.

P. 378, last line but one.

Add, "And in fact, this opinion agrees with all the modern experiments, which shew the sulphureous acid differs from the sulphuric or dense vitriolic acid, in no other respect, but in containing a greater proportion of sulphur."

P. 388, l. 9 (from the bottom).

Add, "though it may be easily conceived that the effect of the explosion should be directed equally on all sides or circularly."

ALTERATION IN CHAPTER V.

On Plumbago.

P. 391.

THIS chapter is omitted in the present place, and its substance is transferred to page 290 of the third volume, in the chapter on Iron; at which place we shall speak of those alterations.

ALTERATIONS AND ADDITIONS IN
CHAPTER VI.

P. 400.

On Metallic Substances in general.

THIS chapter is numbered V. in the new edition.

P. 426, l. 12 (from the bottom).

Add, "But as no one has proved the identity of light, and that which Stahl called phlogiston, nor the existence of light in combustible bodies, the opinion of Macquer is purely an hypothesis, which may be entirely passed over, and which it is no longer allowed to admit."

P. 428, l. 13 (from the bottom).

After the word "heat," insert, "by vital air, whose oxigene they absorb, by alkalis, which separate the metallic oxides," &c.

—— l. 8 (from the bottom).

Instead of "produced," read, "disengaged during its action on these substances."

—— l. 4 (from the bottom).

For "all chemists," read, "the modern chemists."

P. 429,

P. 429, l. 11 (from the bottom).

Read, "solutions in the sulphuric and nitric acids." And add, "The metallic muriates, or combinations of metals with the marine acid, are many of them volatile."

P. 434.

In the first division of semi-metals, "molybdena and tungsten" are inserted immediately after "arsenic."—The rest of the arrangement continues as before.

ALTERATIONS AND ADDITIONS IN CHAPTER VII.

(Numbered VI. in the new edition.)

P. 438, last line.

FOR “think,” read, “have proved.”

P. 439, l. 14.

For “calx,” read, “regulus.”

—— l. 18.

Infert, “by a kind of efflorescence.”

P. 442, l. 7.

“We shall only remark, in this place, that the oxide of arsenic deprives the nitric acid of great part of its oxigene.”

P. 444, l. 9 (from the bottom).

“But it is to Scheele, as we shall presently observe, that we are indebted for an accurate knowledge of these new combinations.”

P. 451.

After the chapter on Arsenic, on account of the additions, alterations, and transpositions in the matter of chapter XI. page 262, which
enters

enters into chapter VII. and VIII. of the present section, the Editor has chosen, for the convenience of the reader, to give the whole together in this place, rather than mark all the changes, which would scarcely have been more concise.

CHAPTER VI.

P. 451.

[This chapter is transferred, with considerable alterations and amendments, from page 262.]

Concerning Molybdena and the Molybdic Acid.

“WE give the name of molybdena to a new semi-metal, discovered by Mr. Hielm, and obtained from a mineral substance known by the same name. This substance must not be confounded with common black lead, plumbago, or black chalk which is used in drawing, and is at present denominated carbure of iron: this confusion has certainly occasioned some difference of results in the labours of those chemists who have examined this substance, from the time of Pott to that of Scheele. It must be observed, that the carbure of iron, or plumbago, being much more common than molybdena, very few specimens of which are to be met with in cabinets of natural history, chemists have almost always made their experiments with the former, Messrs. Quist and Scheele excepted.

The true ore of molybdena is not easily distinguished from carbure of iron, in its external characters: nevertheless, the molybdena is rather fatter to the touch. It is composed

of hexagonal scales, of greater or less size, very slightly adhering to each other: it soils the fingers, and leaves traces upon paper, which are blueish or of a silvery grey colour. When it is reduced to powder, which is difficult to be performed, on account of the elasticity of its scales, it has a blueish colour: it yields easily to the knife, is not brittle, and has not the granulated texture of carbure of iron. In order to pulverize the ore of molybdena, it is necessary, after the process of Scheele, to throw a small quantity of sulphate of potash (vitriolated tartar) into the mortar along with it; the powder must afterwards be washed with hot water, which carries off the salt, and the mineral remains pure. The analysis of this mineral, made by different means, proves that it is a compound of sulphur and the semi-metal which we are now examining. This last, however, is very difficult to be obtained: the illustrious Scheele did not succeed in reducing its oxide or calx into metal, either with black flux and charcoal, or with borax and the same combustible substance, nor with oil. Bergman affirms, that Mr. Hielm has been more fortunate, and that he succeeded in obtaining a sufficient quantity of the semi-metal to exhibit its properties; but since the time of this note of Bergman, Mr. Hielm has published nothing on the subject *. Mr. Pelletier, in his experiments

* A paper of Mr. Hielm, on this subject, has been lately published in the *Journal de Physique*, for May, 1789, translated

riments on the reduction of the oxide and acid of molybdena, never obtained a button of molybdena, but an agglutinated, blackish, friable substance, possessing the metallic brilliancy: by the magnifier, small, round, brilliant, and greyish grains were seen, which Mr. Pelletier considers as the metal or pure molybdena. Manganese likewise has not yet been obtained, except in the form of globules.

The following are the properties which have been observed, in consequence of the trials made of this semi-metal. Molybdena is grey, in the form of small agglutinated grains, brittle, and extremely infusible: when heated in contact of air, it changes into a white oxide, which is volatile, and crystallizes by sublimation into brilliant needle-formed prisms, resembling those of antimony. This oxide, when supersaturated with oxigene, becomes acid, and is the saline product which is best known, in consequence of the researches of Scheele. The nitric acid readily calcines, and

translated from the Swedish Transactions. It contains an account of the habitudes of the calx of manganese, with some of the metals, and an account of some trials to reduce it. The regulus, which was sent to Bergman, was obtained as follows: Vegetable alkali was neutralized by repeated fusions with bullock's blood; the earth of molybdena was heated with a small quantity of grease, which gave it the appearance of a black powder. Equal parts of this alkali, and of microcosmic salt, together with a small quantity of black flux, were used for the reduction, common salt being used sometimes to cover the whole, and sometimes mixed with it. The fusion was made in a covered and luted crucible, exposed to the heat of a good furnace for several hours. — Note of the Translator.

converts it into a white oxide, and even into molybdic acid. The oxide of molybdena becomes blue and brilliant during its translation to the metallic state. Alkalis, assisted by the action of water, calcine and dissolve this semi-metal; it is capable of uniting with lead, copper, iron, silver, and forms granulated, greyish and very friable alloys. Lastly, when combined with sulphur, it constitutes the sulphure of molybdena, a compound which is perfectly similar to the ore of this metal, improperly known by the names of molybdena and potlot. As it is this last ore which has been the subject of the experiments of Scheele, and as it is with this mineral, which is much better known than the metal it contains, that this chemist prepared the acid of molybdena, we shall proceed to examine its properties more at large. Potlot, or native sulphure of molybdena, exposed to heat in an open vessel, gives out sulphur, and evaporates almost totally in the form of a white smoke: exposed to the flame of a lamp, urged by a blow-pipe, in the metallic spoon, it emits the same fumes, which are condensed into yellowish crystalline blades, and assumes a blue colour, by the contact of combustible substances. Mr. Pelletier having calcined the sulphure of molybdena in a crucible covered by another crucible, obtained white, brilliant, needle-formed crystals, similar to those which are called the silvery flowers of antimony. This sublimed

oxide of molybdena already possesses the characters of an acid; but this process would be too tedious and expensive to be used in the preparation of the acid of molybdena.

Saline earths and fixed alkalis, fused with the sulphure of molybdena, dissolve both the sulphur and the metal.

Some acids produce remarkable alterations in this ore.

The concentrated sulphuric acid oxides or calcines the metal, and flies off in the form of sulphureous acid, by the assistance of a boiling heat.

The muriatic acid has no action on this mineral.

The arsenical acid, distilled from the sulphure of molybdena, yields its oxigene to part of the sulphur, which becomes sulphureous acid. It is volatilized in the form of orpiment with part of the same sulphur, changes a portion of the molybdena into the molybdic acid, and leaves the greatest part in the metallic state. Mr. Pelletier concludes, from this experiment, that molybdena exists in the metallic state in its ore.

By distilling 30 ounces of nitric acid diluted with water, from 1 ounce of molybdena, at five successive operations, that is to say, 6 ounces of the acid at a time, a great quantity of nitrous gas is disengaged, and a white powder remains in the retort, which must be washed with a sufficient quantity of cold distilled

tilled water to carry off the foreign acid, which is soluble at this temperature. After theedulcoration, there remain $6 \frac{1}{4}$ drachms of the pure molybdic acid. Scheele, to whom this discovery is due, thinks that the nitric acid seizes phlogiston, and escapes in red vapours; it likewise burns the sulphur which exists in the molybdena, and hence it is that the water employed in washing the acid of molybdena, contains sulphuric acid; which may be obtained in a concentrated state by evaporation, and holds a small quantity of molybdena in solution. This substance gives a blue colour of considerable brilliancy to the liquor. We are of opinion, that, in this operation, as well as in all those in which the nitric acid, distilled from any substance whatever, reduces it into the state of acidity, the former is decomposed; and that it is to the separation of the oxigene of the nitric acid, and its fixation in the molybdena, that the disengagement of the nitrous gas and the formation of the sulphuric and molybdic acids, are owing.

The acid of molybdena, obtained by the process we have just described, has the form of a white powder, of a slightly acid and metallic taste. When heated in the spoon by the blow-pipe, or in the crucible with the contact of air, it is volatilized in a white fume, which is condensed in needle-formed crystals, at the same time that part is melted on the sides of the crucible: notwithstanding the

edulcoration, it retains a portion of sulphureous acid, which a strong heat completely disengages.

This acid is soluble in boiling water. Scheele dissolved a scruple in 20 ounces of water: this solution has a singularly acid and almost metallic taste; it reddens the tincture of turnsole, decomposes the solution of soap, and precipitates alkaline sulphures, or livers of sulphur. It becomes blue and consistent by cold.

The molybdic acid dissolves in great quantities in the concentrated sulphuric acid, by the assistance of heat. This solution assumes a fine blue colour, and becomes thick by cooling. Both phenomena may be made to disappear by heat, and re-appear again in proportion as the fluid cools. If the combination be strongly heated in a retort, the sulphuric acid is volatilized, and the molybdic acid remains in a dry state at the bottom of the vessel.

The nitric acid has no action on the molybdic acid.

The common muriatic acid dissolves a large quantity. This solution affords a residue of a deep blue colour, when distilled to dryness. If the fire be more strongly urged, the residue affords a white sublimate, and another blueish; a grey residue remaining in the retort. The sublimate is deliquescent, and colours metals blue; the muriatic acid passes oxygenated in the receiver. It is easy to understand, that, in this operation, the muriatic acid deprives the
molybdic

molybdic acid of a portion of oxigene, and that a portion of this acid passes to the state of molybdena.

The molybdic acid, by the assistance of heat, decomposes the alkaline nitrates and muriates, by disengaging their acids, and forms with their bases neutral salts, whose properties Scheele did not examine. This acid likewise disengages the carbonic acid from the three alkalis, and forms neutral salts with their bases.

Though Scheele has not made us acquainted with all the properties of the neutral salts which we design by the names of molybdates of potash, of soda, of ammoniac, &c. he has nevertheless pointed out three, which are sufficient to characterize their state of neutralization. He has discovered, 1. That fixed alkali renders the acid earth of molybdena more soluble in water. 2. That this salt prevents the acid of molybdena from volatilization by heat. 3. That the molybdate of potash falls down by cooling in small crystalline grains, and that it may likewise be separated from this solvent by the sulphuric and muriatic acids.

The acid of molybdena decomposes the barytic nitrate and muriate. The barytic molybdate, formed in these operations, is soluble in water.

The acid of molybdena appears partly to decompose the sulphate of potash, or vitriolated

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tartar,

tartar, and disengages a small quantity of sulphuric acid, by a strong heat.

The molybdic acid dissolves several metals, and assumes a blue colour in proportion as this acid abandons to them part of its oxygen. It precipitates several metallic solutions."

CHAPTER VII.

[This chapter, which is transferred from page 269, with considerable alterations and amendments, is inserted immediately after the foregoing.]

Concerning Tungsten and the Tungstic Acid.

“THE mineral named Tungsten by the Swedes, and called ponderous stone, lapis ponderosus, by several naturalists, and in particular by Bergman in his *Sciagraphia*, was considered by Cronstedt as a species of iron ore, and distinguished by him under this description: *ferrum calciforme terrâ quâdam incognitâ intimè mixtum*. Most of the German naturalists arranged it among the ores of tin, under the name of white tin crystals, or zinnspath; and in almost all collections of natural history, it was exhibited as belonging to that metal.

The accurate analysis of this mineral was not attempted before Scheele; this chemist having examined this pretended tin ore, discovered by his experiments that it was composed of a peculiar acid united to lime. Bergman likewise found the same results by a connected series of experimental enquiries. This discovery was made in the year 1781.

Since

Since this time Messrs. D'Elhuyar*, of the Royal Society of Biscay, Mr. Angulo, of the Academy of Valladolid, and Mr. Crell, have repeated the experiments of the Swedish chemists, and confirmed their results. After the definition we have given of this natural salt and its acid, we must observe that that which the Swedes called tungsten is a salt formed by the tungstic acid and lime. We adopt this name of tungsten for the semi-metal, which appears to be the base of this acid, and we shall call this species of mineral, the native tungstate of lime.

Messrs. D'Elhuyar, of the Biscayan Society, have discovered that wolfram, which was formerly considered as a poor ore of iron, is a combination of this acid of tungsten with manganese and iron. They obtained a peculiar regulus from this semi-metal. The wolfram they used came from the tin mine of Zinwalde. It is in compressed hexahedral prisms; it has the metallic brilliancy, plated fracture, and may be cut with a knife. It contains in the quintal 22 parts of black oxide of manganese, 12 of the oxide of iron, 64 of the tungstic acid, and 2 of quartz. The native tungstate of lime from Schleckenwalde in Bohemia, contains, according to them, 68 parts of tungstic acid, and 30 of lime.

* The name is spelled De Luyartt in Cullen's translation of their Analysis of Wolfram, published in London in the year 1785.

These are the two known ores of the new semi-metal which we call tungsten. Messrs. D'Elhuyar fused 1 part of wolfram with 4 parts of the carbonate of potash or mild vegetable alkali; they lixiviated this mixture; the water dissolved the tungstate of potash, or combination of the alkali with the acid of tungsten, and they precipitated this acid in the form of a yellow powder by the addition of nitric acid. This precipitate, urged by heat in a crucible with charcoal, afforded a metallic button composed of a number of small friable globules. The following are the properties observed in this new semi-metal: a considerable specific gravity, though never exceeding 17,6; very great infusibility, which appears to exceed that of manganese; indissolubility in the three strongest acids, and even in the nitro-muriatic acid, or aqua regia; an easy union with some metals, particularly with iron and silver, whose properties it singularly alters; a facility of oxidation or calcination, by which it is converted into a yellow oxide, which becomes blue by heat; it is indissoluble in acids, soluble in alkalis, remains suspended in water by trituration, and resembles an emulsion. Though some of these characters be analogous to those of molybdena, as Bergman and Scheele had before shewn in the molybdic acid, their union is nevertheless sufficient to cause tungsten to be considered as a peculiar semi-metal. But
many

many experiments are still wanting for the exact determination of all its properties.

The chemists who have employed themselves on this inquiry have made many more researches on the native tungstate of lime, than on the semi-metal which Messrs D'Elhuyar have obtained. In order to exhibit the whole of their discoveries on this mineral, it is necessary that we should dwell for some time on its properties.

The tungstate of native lime has been hitherto scarce ; it is found in the iron mines of Bitzberg, in the tin mines of Schleckenwalde in Bohemia ; and most of the white tin crystals of Sauberg near Ehrenfriedersdorf, are tungstate of lime : so that, by assaying the white tin crystals preserved in collections by the methods we shall point out, it will be easy to discover some samples whose nature was not suspected.

The tungstate of lime is not sensibly altered by heat ; it decrepitates, and is reduced to powder by the action of the blow-pipe, but it does not melt. The blue flame colours it slightly, and nitre deprives it of this colour.

Boiling water has no action upon the powder of this metallic salt, and it is perfectly insoluble. The action of the air, the salino-terrestrial substances, and the caustic alkalis upon this substance are not known.

The sulphuric acid, heated and distilled upon the native tungstate of lime, comes
over

over without alteration; the residue assumes a blueish colour; by washing with boiling water, a small quantity of calcareous sulphate or selenite is obtained, which proves that this substance contains lime, and that the sulphuric acid decomposes only a very small portion.

Diluted nitric acid acts upon this salt by the assistance of heat, but without sensible effervescence. This acid gives it a yellow colour, which distinguishes it from the true ore of tin, and it decomposes this substance by seizing its lime; about twelve parts of nitric acid in the state of ordinary aqua fortis are required for the complete decomposition of one part of calcareous tungstate. Scheele performed this operation at several repeated times. After the action of three parts of weak nitric acid upon one part of this neutral salt, he pours two parts of caustic volatile alkali, or ammoniac, upon the powder, which the nitric acid had changed to a yellow colour. It becomes white by the action of the alkali; and he repeats this successive action of the acid and the alkali, until the whole of the calcareous tungstate is entirely dissolved. From four scruples, treated in this manner, he had three grains of residue, which appeared to be siliceous. By precipitation from the nitric acid employed in this solution, by the addition of the prussiate of potash, and afterwards by potash itself, he obtained two grains of prussiate of iron or Prussian blue, and fifty-three grains of chalk:

the ammoniac or volatile alkali, by the addition of nitric acid, afforded an acid precipitate. In this experiment, the nitric acid decomposes the calcareous tungstate by seizing the lime; and the tungstic acid, which is set at liberty by this decomposition, is seized by the ammoniac. The ammoniacal salt formed by this last solution is decomposed by the nitric acid, which has a stronger affinity with the ammoniac than this last has with the tungstic acid. As this last acid is much less soluble than the ammoniacal tungstate, it falls down, in proportion as it is set at liberty, in the form of a white powder. This powder is lixiviated with cold distilled water, in order to have the tungstic acid in a state of purity.

This acid may likewise be obtained by another process, which Scheele employed with equal success. One part of native calcareous tungstate in powder is fused in an iron crucible, with four parts of carbonate of potash; this mass is lixiviated with twelve parts of boiling water, and nitric acid is poured on until there be no more effervescence: the fusion is then made a second time with four parts of carbonate of potash, the matter is again lixiviated with water, and treated with nitric acid until the cessation of the effervescence; at which time there remains only a small portion of flint, and all the tungsten is decomposed. In fact, during the fusion the potash seizes the tung-
stic

stic acid, with which it forms a peculiar neutral salt, while the carbonic acid unites to the lime, which it changes into chalk. When the melted mass is lixivated, the water dissolves the tungstate of potash, which is much more soluble than the chalk, which remains alone; the nitric acid, employed afterwards, dissolves the chalk with effervescence, without affecting that portion of calcareous tungstate which the first four parts of alkali did not decompose. At the second operation, the salt being completely decomposed by the other four parts of carbonate of potash, the nitric acid seizes all the chalk; so that, by the assistance of eight parts of fixed alkali and a small quantity of aqua fortis, successively employed, the principles of calcareous tungstate are entirely separated; its acid is united with the potash, and its lime combined with the nitric acid. By precipitating the calcareous nitrate by potash, the quantity of lime contained in the calcareous tungstate made use of, comes to be known; and nothing more remains to be done but to separate the tungstic acid which is united to the fixed alkali. For this purpose, the process described in the first experiment is made use of. A sufficient quantity of nitric acid is poured into the lixivium of the melted mixture of tungstate of lime with the carbonate of potash; this lixivium becomes turbid and thick, because the nitric acid having a stronger affinity with the
fixed

fixed alkali than the tungstic acid has, this last is precipitated in powder, and the liquor holds nitre in solution. The precipitate is then to be washed with cold water, and affords the pure tungstic acid in the form of a white powder, as in the first operation. This process is even preferable to the other, because more easy and less expensive*.

The muriatic acid acts upon calcareous tungstate in the same manner as the nitric acid does, and decomposes it with the same energy; and, as it produces a deeper yellow colour, Bergman recommends it for assaying and distinguishing this earthy salt.

The tungstic acid obtained by either of these three processes has, as we observed, the form of a white powder. By the blow-pipe it becomes yellow, brown, and black, without melting or volatilizing. It is soluble in twenty parts of boiling water; the solution has an acid taste, and reddens the tincture of turnsole.

The tungstic acid appears to form with barytes, a salt absolutely insoluble in water; and with magnesia, another salt of difficult solution.

* The Author has overlooked the determination of Messrs. De Luyart, as mentioned in the Translator's note, page 277. They have clearly determined that both these white powders contain nitrous acid and alkali, from which foreign admixtures it may be deprived by repeated boiling with nitrous acid, and calcination, as mentioned in the said note.

When its solution is poured into lime-water, it produces a small precipitate, which is greatly increased by heat, and consists of regenerated calcareous tungstate according to Scheele.

The tungstic acid saturated with potash affords a salt which falls down in very small crystals, whose form has not yet been determined. Scheele does not speak of its combination with soda. According to him, it forms, with ammoniac, a salt in the form of very small needles: this ammoniacal tungstate, when exposed to heat in a retort, lets the ammoniac escape, and the tungstic acid remains in the form of a dry, yellowish powder: the same salt decomposes calcareous nitre, and again forms the tungstate of lime.

The tungstic acid, heated with the sulphuric acid, assumes a blueish colour; with the nitric and muriatic acids, it becomes a lemon yellow; with alkaline sulphur, it affords a green precipitate. Scheele has not determined the cause of these changes of colour.

This chemist having observed, that the tungstic acid readily becomes coloured by combustible substances, and itself gives a blue colour to vitreous fluxes, such as borax, &c. heated this acid in a crucible with linseed oil; but he did not obtain metal, and the acid was only blackened. Bergman, however, was of opinion, from the considerable specific gravity of this acid, its coloration by inflam-

mable bodies, and its precipitation by the prussiate of potash, or Prussian alkali, that it is of metallic origin. We have already mentioned the process by which Messrs. D'Elhuyar succeeded in reducing the tungstic oxide obtained from wolfram into metallic globules, and the metallic nature of this acid is no longer a problem."

ADDITION IN CHAPTER VIII.

(Numbered IX.)

P. 461, at the end.

INSERT, "A sympathetic ink is likewise made from this substance."

S U P P L E M E N T

TO THE

E L E M E N T S

O F

N A T U R A L H I S T O R Y

A N D

C H E M I S T R Y.

ALTERATIONS AND ADDITIONS IN
VOLUME III.

C H A P T E R IX.

(Numbered X. in the new edition.)

P. 6, l. 7 (from the bottom).

INSERT, "The fulphite of bismuth is
not known."

P. 7, l. 9.

Read, "perhaps it may be charcoal."

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P. 9,

P. 8, l. 7 (from the bottom).

Add, "The nitrite of bismuth is not known."

—— l. 7.

For "butter," read, "soft salt, improperly called butter of bismuth."

CHAPTER X.

(Numbered XI. in the new edition.)

THIS chapter is not altered.

ALTERATIONS AND ADDITIONS IN
CHAPTER XI.

(Numbered XII. in the new edition).

P. 26, l. 5 (from the bottom).

ADD, "A small portion of this substance is found in all charcoals."

P. 27, after l. 13, the following is added:

"Soon afterwards they fall into a black powder, and then resemble the native oxide or calx of manganese.

This rapid oxidation of the regulus of manganese by the contact of air, is a fact which I have always considered as very singular. The metallic globules, which are hard, brilliant, and very refractory, remain entire for a long time in a well-closed bottle, provided their surface be entire, and covered with that small stratum of oxide which is formed during the fusion of this semi-metal: but if one of these globules be broken into three or four fragments, we find, by fixing the eye for some minutes upon their fracture exposed to the air, that their colour is quickly altered; that, instead of the white colour it had before, it becomes very speedily of a rose,
13 purple

purple, or violet colour, and at last almost brown. If the fragments be left in a bottle which contains at the same time a certain quantity of air, and they be shaken from time to time, it is found, at the end of some months, that they are reduced into a powder which is almost black. This is a sort of pulverization, analogous to that of saline substances or pyrites. It proves the strong attraction which exists between manganese, and the atmospheric oxigene, and the rapidity with which these substances tend to unite."

P. 27, l. 13 (from the bottom).

After the word "substances," insert, "Nitre revivifies, or causes the speedy re-appearance of this brown or violet colour, by restoring the oxigene to the manganese. This is the reason why the matrasles and retorts of white glass, which we use in our laboratories to obtain vital air from nitre, always acquire a brown or violet colour. Scheele has made," &c.

——l. 9 (from the bottom).

Read, "well known."

P. 28, l. 4.

Insert, "Scheele has given the name of cameleon mineral to a combination of vegetable alkali and calx of manganese, which assumes a beautiful green colour in hot water, and is red in cold water. The oxigene and caloric appear to be the principal causes of the phenomena

nomena presented by this combination. Perhaps the azote, which I consider as the alkali-fying or alkaligene principle, may disengage itself from the vegetable alkali in this operation, and may partly occasion these singular modifications of colour."

P. 28, l. 10.

Read, "This sulphate is decomposed by fire, and affords vital air. The alkalis separate an oxide of manganese, which becomes blue by exposure to the air."

P. 30, l. 8.

Add, "It is the cameleon mineral of Scheele, which we have already spoken of."

P. 31, l. 8.

The five following lines of the paragraph, and also the next paragraph ending with the word "calx," are left out.

—— l. 2 (from the bottom).

The sentence expressing the opinion of Scheele is left out.

P. 32, l. 8.

Add, "and for a great number of other experiments.

This native oxide affords, by mere heat alone in the pneumato-chemical apparatus, very pure vital air, or oxygenous gas. It is this vital air alone which can be used to ad-

vantage by patients whose disorders require the administration of this fluid.

The affinity of manganese for the principle of combustion, serves likewise to guide modern chemists in a great number of cases."

ALTERATIONS AND ADDITION IN CHAPTER XII.

(Numbered XIII. in the new edition, with which the III^d. volume of that edition commences.)

P. 43, l. 18.

ADD, "The oxygenated muriatic acid oxidizes antimony with the greatest facility."

P. 49, last line.

Read, "in the same manner as inflammable gas;" and leave out the remaining four lines of the paragraph.

ALTERATIONS AND ADDITIONS IN
CHAPTER XIII.

(Numbered XIV. in the new edition.)

P. 71, l. 19.

READ, "In this state it is sometimes confounded with plume alum."

P. 79, l. 15.

Insert, "by the assistance of an elevated temperature."

—— l. 18.

Add, "The hydrogenous gas obtained in this process, holds a small quantity of charcoal in solution, which comes from the zinc."

P. 80, l. 14.

Read, "which was long unknown, but is found to consist of carbure of iron or plumbago."—And in the following line, read, "inflammable gas, holding a small quantity of charcoal in solution."

P. 81, l. 4.

Read, "vitriol of zinc, known in the arts by the name of white copperas, white vitriol, gossar vitriol, are easily," &c.

—— l. 7 (from the bottom).

Read, "After the action of the heat, this sulphate

phate appears to be converted into fulphite of zinc, or a sulphureous salt, whose properties are not well known. • The sulphate, or vitriol of zinc, is very little altered by exposure to air, when it is very pure: in the course of time, its oxide becomes calcined still more by absorbing oxigene; it assumes a yellow colour, and is no longer perfectly soluble in water. This sulphate, or vitriol of zinc, is decomposable by alumine or argillaceous earth, barytes, magnesia, lime, and the three alkalis."

P. 84, l. 1.

Read, "blackish matter, or carbure of iron."

P. 85, l. 1.

Add, "It may be conceived, that heat disengaging the nitrous gas of this salt, it passes to the state of nitrite of zinc. It likewise affords a certain quantity of oxigenous gas or vital air."

—— l. 13.

Insert, "If fuming nitrous acid be used in this solution, the produce is nitrite of zinc, whose properties are not yet exactly known."

—— l. 11 (from the bottom).

Read, "which is nothing else but a combination of carbone, or charcoal and iron, or carbure of iron;" and cancel the three following sentences, which contain the notions of several chemists respecting it.

P. 86,

P. 86, l. 4 (from the bottom).

Insert, "The oxygenated muriate of zinc is not yet known."

P. 90, l. 4.

Insert, "and which decomposes the water."

P. 93, l. 7 (from the bottom).

Cancel the four lines, beginning with the words "and the black matter," and ending with the word "substances."

P. 99, l. 13.

Instead of the conjectures which terminate this paragraph, the Author ascribes the effect in question to the conducting power of the mercury.

ALTERATIONS AND ADDITIONS IN CHAPTER XIV.

(Numbered XV. in the new edition.)

P. 100, l. 5.

READ, "The mercury is slightly calcined in this experiment."

P. 109, l. 16.

Read, "appeared to him to consist of mercury."

—— l. 19.

Add, "produced by the air contained in the apparatus."

P. 111, after line 12.

Insert, "Mercury is infinitely more susceptible of calcination by the contact of air, and many other bodies, than has hitherto been supposed. A grey blackish pellicle is continually formed upon its surface, which is a true oxide of mercury."

Heated with the concurrence of air, this metal, at the end of some days, becomes changed into a brilliant red powder," &c. as in line 15.

P. 118,

P. 118, l. 1.

The six following lines, from the full stop to the word "reduction," are left out.

P. 122, l. 10 (from the bottom).

Insert, after "calx," "Because it cannot become charged with the calx, which is superabundant to its combination, but by means of heat, distilled water," &c.

P. 123, l. 5 (from the bottom).

Add, "The excess of mercurial calx, which renders the nitric solutions capable of being decomposed by water, is likewise attended with a circumstance which favours this decomposition; it is, that the oxide is so strongly calcined or oxygenated, that it has but very little adherence with the nitric acids."

P. 129, l. 6.

Insert, "Those which, without having been precipitated by carbonates or cretaceous alkalis, have been merely exposed to the contact of atmospherical air, exhibit the same phenomenon, because they always absorb this acid from the atmosphere; a property common to all the oxides of mercury, and even to those of several other metals."

P. 137, l. 4 (from the bottom).

Add, "Because this semi-metal being already charged with oxigene, cannot take it from the
oxide

oxide of mercury, nor consequently disengage it from its muriatic combination."

P. 139, l. 5 (from the bottom).

The first seven lines of this paragraph are erased, and the following substituted instead :

" This sublimed muriate of antimony, or the combination of the muriatic acid with antimony, does not take place but in proportion as the semi-metal takes the oxigene from the mercury, as we have already observed of arsenic. This compound," &c. as in line 3, page 140.

P. 140, l. 9.

After the word " cooling," add, " for which reason it has been called butter of antimony."

P. 147, l. 9 (from the bottom).

The rest of the paragraph is thus altered :

" Or, which is the same thing, that the calx is much more calcined in the corrosive muriate than in the mild. So that when running mercury is triturated with corrosive mercurial muriate, the mercury seizes the excess of oxigene of the muriatic acid, or that of the former mercurial muriate: and the more considerable dose of new oxide less calcined, which unites to the muriatic acid, causes the nature of the salt to vary, which becomes less saline, less sapid, less soluble, and, in a word, in which the properties communicated to the
I mercury

mercury by the oxigene, are weakened in proportion as the quantity of that principle is diminished."

P. 148, l. 14 (from the bottom).

Insert, " It must be observed, however, that this salt contains a portion of the oxide or calx of mercury, which is not combined with the acid of borax, because of the soda, which is in excess in the borax of commerce. If pure borax of mercury be required to be had by this process, it will be necessary to employ a borax of soda perfectly neutral; that is to say, the borax of commerce, saturated with as much of the acid of borax as it can take up. Sal ammoniac renders," &c.

P. 149, l. 9.

Add, " though the oxides or calces of mercury absorb, with considerable efficacy, the carbonic acid contained in the atmosphere."

ALTERATIONS AND ADDITIONS IN CHAPTER XV.

(Numbered XVI. in the new edition.)

P. 158, l. 14 (from the bottom).

INSTEAD of the remainder of this paragraph, the following is inserted: "It must be here remembered, that most of the crystals of white tin ore which are met with in collections, consist of native tungstate of lime, and that this salt must not be confounded with the oxide or calx of tin, which does not turn yellow by the contact of acids."

P. 159, l. 11.

Insert, "Mr. Kirwan affirms that the black tin ore contains $\frac{80}{100}$ of tin and iron."

P. 160, l. 15.

The last sentence of this paragraph is omitted.

P. 165, l. 10.

Insert, "Notwithstanding this experiment, the calx of tin is considered as infusible, and it certainly requires a fire," &c.

P. 168, l. 14.

The two following sentences are erased, and the following is inserted :

“ Mr. De Morveau has observed, that, in a solution of tin by the nitric acid, no gas is disengaged, but that ammoniac is formed. We see, therefore, that the tin not only decomposes the nitric acid, but likewise the water, which uniting to the azote of the nitric acid, forms the ammoniac or volatile alkali produced in this operation.”

P. 170, l. 1.

Read, “ fetid inflammable gas.”

——l. 3.

Insert, “ The water is therefore decomposed by the tin with the assistance of the acid.”

P. 183, after l. 2.

Insert the following paragraph : “ Mr. Adet, who read a memoir to the Academy upon the fuming liquor of Libavius, has shewn, (1) That the effervescence, which takes place as often as it is mixed with water, depends on the disengagement of an elastic fluid, which possesses all the properties of azotic gas: (2) That the fuming liquor, combined with water, in the proportion of 7 to 22, forms a solid body, which melts by the action of heat, congeals by cold, and resembles the oxygenated muriate of tin or butter of

K

tin :

tin: (3) That the fuming liquor, diluted with water, dissolves tin without the disengagement of hydrogenous gas, and affords a salt similar to that which is obtained by the direct combination of the muriatic acid and tin. He concludes, from his various experiments, that the fuming liquor is nothing else but a compound of the muriatic acid in the aeriform state, and the oxide, or calx of tin in which oxigene predominates; and that this salt is the same, with respect to the common muriate of tin, as the oxigenated muriate of mercury or corrosive sublimate is to the muriate of mercury or mercurius dulcis.

ALTERATIONS AND ADDITIONS IN CHAPTER XVI.

(Numbered XVII. in the new edition.)

P. 188, l. 10 (from the bottom).

READ, "the name of Saturn, because it absorbs and devours, as it were, all the imperfect metals in its scorification, as we shall hereafter shew."

P. 194, l. 5.

Insert, "Mr. De Laumont has given a memoir upon the native phosphoric salt of lead, which is very abundant in Brittany."

P. 204, l. 14.

Add, "Mr. Luzuriaga has observed, that by agitating granulated lead in a small quantity of water, with the contact of air, the metal becomes quickly calcined."

P. 210, l. 2.

Insert, "Nevertheless, since it has been discovered that the calces of lead, and especially the red calx or minium, contain carbonic acid, which they absorb from the atmosphere, it is conceived that the ammoniac or volatile alkali, disengaged by these oxides, must take up a part."

ALTERATIONS AND ADDITIONS IN CHAPTER XVII.

(Numbered XVIII. in the new edition.)

P. 219, l. 4.

AFTER the word, "rust," insert, "It then forms the ochreous iron ores. All earths which are of a brown or red colour are of this species.

(3) The iron ores, which are called bog ores, must not be confounded with the ochres: these ores indeed contain oxidized iron; but this oxide is combined with the phosphoric acid, which appears to arise from the decomposition of vegetables: it is distinguished into," &c. as in line 4.

—— l. 10 (from the bottom).

The concluding sentence of this paragraph is omitted, and the following is added: "Bergman, who was acquainted with this state of iron, without having determined its nature, called this phosphate of iron siderite; some German chemists have since called it water-iron. We shall hereafter explain the means of separating this salt from iron, which is brittle in the cold.

(4) "The eagle stones," &c. and proceed as in line 5 from the bottom.

P. 221, l. 1.

Read, "The load-stone is a very hard and very refractory ochreous iron ore."

P. 222, l. 3.

Add, "The manganese which it often contains renders it changeable in the air, and causes it to assume a brown colour, in proportion as it loses its form and consistence."

P. 225, l. 7 (from the bottom).

Insert, "The laminated and brilliant iron ore of Fremont likewise belongs to this species."

P. 226,

The paragraph numbered 13 is left out.

P. 229, l. 3 (from the bottom).

Add, "The true cause of the brittleness, fusibility, granulated texture, and all the other properties of cast iron, has been put out of doubt by the valuable researches of Messrs. Vandermonde, Monge, and Berthollett. They have proved that crude iron contains oxigene and charcoal: this last has been absorbed during the fusion in the smelting furnaces. It is to the several quantities of these two foreign substances that cast iron owes its different qualities.

P. 230, l. 7.

Instead of the twelve following lines, insert, "These different characters depend on the quantity of oxigene, and more especially of charcoal, contained in the crude iron. When the charcoal is very abundant, and uniformly mixed, the cast iron is black; a somewhat smaller quantity of that substance forms the grey cast iron; an imperfect mixture too quickly made, and suddenly cooled, constitutes speckled iron; and the white crude iron contains the least possible quantity of charcoal. All these qualities influence the nature and use of crude iron, and especially its convertibility into malleable iron. The philosophers above quoted have discovered that when crude iron is fused, there is always separated a portion of charcoal intimately united to a small quantity of iron, or carbure of iron. This compound, hitherto called plumbago, covers the ladles with which the cast iron is taken up and poured out.

To convert crude into malleable iron, it is necessary to deprive it of charcoal and oxigene. A strong heat, which thoroughly penetrates the whole mass, is necessary to obtain this reduction. It may be easily conceived, that at a high temperature the charcoal must burn by seizing the oxigene, and will disengage itself with effervescence. For this purpose it is taken to the refining furnace. This is a hearth somewhat hollow, in which
a mass

a mass of crude iron is placed, and covered with a large quantity of charcoal. The fire is urged by bellows until the iron melts, in which state it is wrought or kneaded, and repeatedly turned over with proper instruments. This agitation causes it to present a larger surface, so that the portions of charcoal take the oxigene from the iron, are burned, and give out carbonic acid gas. The metal appears likewise to be deprived of a portion of siderite or phosphate of iron. It is then carried to the hammer," &c. as in line 20.

P. 232, l. 4.

Insert, "but these matters appear to do oftener harm than good."

— l. 12.

Instead of the five following lines, insert, "The iron being softened and dilated, absorbs the charcoal which surrounds it; and the steel of cementation is nothing else but a combination of pure and well-reduced iron with charcoal. It differs from iron in containing charcoal, and from pure crude iron in containing not only charcoal, but a greater or less quantity of oxigene. If cast iron be deprived of its oxigene without separating the charcoal, or by giving it a new quantity, steel will be produced without refining the iron. Steel is much more fusible than iron, for which reason the bars which are converted into steel by

cementation, are softened to that degree, that the carbonic acid, which is disengaged in bubbles during the action of heat, forms small blisters, or very sensible cavities on its surface. This kind of steel is called blister steel. The differences of steel depend upon the greater or less reduction, the quantity of charcoal which it contains, and the more or less sudden cooling it has been subjected to. The tempering brings the particles strongly together, and renders it very hard, very dry, and very brittle.

P. 233.

The first four lines are left out.

—— l. 7.

Read, “ Because that metal being more difficult to fuse than others, adheres very strongly to oxigene, and has a strong tendency to combine with it.

—— l. the last but one of the text.

Read, “ and so reducible that they melt very readily and easily absorb charcoal in their reduction, for which reason they are called steel ores.”

P. 234, l. 4.

Instead of “ the purest steel,” read, “ the softest iron.”

The first ten lines of the following paragraph are left out, and it begins at line 15 with the words “ Iron does not melt but by an extreme heat,” &c.

P. 234,

P. 234, l. 5 (from the bottom).

Read, "which arises from its combination with charcoal."

P. 235, l. 11.

Insert, "As in all these fusions the iron becomes brittle and is calcined, at the same time that it assumes a black colour, the workmen in iron, and all who have to do with this metal, do not consider it as fusible; and it is an axiom with them, that iron is absolutely infusible. It may be conceived, however, that this opinion, strictly taken, is erroneous; for by a very strong heat, and without the contact of air, iron melts with scarcely any alteration. In our accurate experiments, small ingots of soft and ductile iron are obtained. Iron, though very hard," &c. and proceed as in line 12.

—— l. 21.

Read, instead of the remainder of the paragraph, "filings of steel, and still more quickly the scales of hammered iron, to heat under a muffle. They are converted into a reddish brown powder, not attractable by the magnet, and called astringent saffron of Mars. We call it the red oxide of iron, and the scales the black oxide. This last substance contains from 20 to 25 parts of oxygen; the red oxide contains from 32 to 34. The oxides of iron vary between these two degrees of oxidation; some are of a yellowish brown, others
of

of a chocolate colour, and others of a beautiful red similar to carmine: all these oxides or calces, when mixed with earthy matters and exposed to a very strong heat, melt into a blackish and porous glass. They are reduced in part by heating them slowly in close vessels: if they have been exposed for a short time to the air, they give out a certain quantity of carbonic acid during their reduction; which proves that they attract this acid from the atmosphere. This acid likewise comes from the charcoal contained in iron, which becomes acid by absorbing the oxigene disengaged during their reduction."

P. 236, l. 15.

For "slowly," read, "slightly;" and instead of the last sentence of the paragraph, read, "But they do not lose all the oxigene which they contain in this operation, and pass only to the state of the black oxide or calx."

P. 239, l. 4.

Insert, "The preparation of lemeri is owing to a true decomposition of the water; hydrogenous gas is disengaged, and the iron becomes calcined by absorbing 25 per cent of oxigene. We shall immediately proceed to treat more at large of this oxidation of iron by water."

P. 241, at the bottom.

Add, "Of this kind is the experiment which
has

has shewn that water is a compound of 0,14 of hydrogen, and 0,86 of oxygen.

P. 242, l. 8 (from the bottom).

Add, "This fluid being decomposed, affords the gas; and its decomposition is favoured by alkalis."

P. 243, l. 15.

Read, "Macquer, Bergman and Kirwan think that," &c.

P. 244, l. 13.

Insert, "This fact is proved because the same quantity of alkali is required to saturate the acid after its action on the iron, as it would have required before. It is therefore," &c.

P. 248, l. 2.

Read, "published among those of the Academy for 1785."

P. 252, l. 13.

The note is omitted, and the following paragraph is added:

"This enquiry of the academicians of Dijon has been confirmed by the researches of Scheele. This celebrated chemist has discovered, that a simple infusion of nut-galls in water affords by separation a peculiar crystallizable acid, which takes iron from many other acids, and colours it black, because it approaches to the metallic state. We call this salt the gallic acid,
and

and shall give an account of it in the history of the vegetable kingdom.

P. 264, l. 10.

Add, "or at least a very small portion of that substance."

P. 268, l. 5.

The following account of Mr. Berthollett's inquiries into the nature of Prussian blue, are inserted in the new edition:

"Mr. Berthollett has made experiments upon the Prussian acid, or colouring matter of Prussian blue, since all these chemists. Although the researches of this learned philosopher have not yet proved entirely satisfactory to himself, they nevertheless contain facts and experiments of sufficient novelty and importance to induce us to insert, in this place, an extract of his Memoir, which he has had the goodness to communicate to us.

Mr. Berthollett, in the first place, distinguishes two kinds of prussiate of iron; the one which is the common Prussian blue, and the other which is the same Prussian blue deprived of a portion of the Prussian acid. He calls this prussiate of iron with excess of oxide. Prussian blue is in this last state, after it has been discoloured by an alkali. To separate this excess of oxide or calx, he uses the muriatic acid, which dissolves it, and leaves the prussiate of iron neutral. He observes with Mr. Landriani, that, when the alkali is digested with
heat

heat upon the Prussian blue, the alkaline prussiate, which is formed, dissolves more of the oxide of this metal than when the digestion is made in the cold. Both these chemists think that an acid added to this triple combination, unites to the excess of oxide of the iron, and causes the Prussian blue to be deposited in the same manner as when the pure prussiate of potash is added to a solution of iron. They add, likewise, that heat causes a precipitate to fall down from this combination, which consists of a yellow prussiate of iron; that is to say, with excess of oxide or calx of iron. According to them, the acid which is added seizes the excess of oxide of iron, and suffers the precipitate of Prussian blue to fall down, which is then less soluble in the alkaline prussiate. When the prussiate of potash, prepared by a gentle heat, has deposited the prussiate of iron, with excess of oxide of this metal, by ebullition, it may be evaporated to dryness, re-dissolved in water, and mixed with acids, without depositing Prussian blue. Mr. Berthollett affirms, that, from the evaporation of prussiate of potash thus purified, octahedral crystals are obtained by evaporation; two of whose pyramids are truncated in such a manner as to represent square plates, whose edges are chamfered off.

This chemist having mixed a solution of these crystals with the sulphuric acid, and exposed the whole in a bottle to the rays of the sun,

fun, saw, that a short time afterwards a blue colour was developed, which formed a precipitate until its total decomposition. A like mixture, preserved in a dark place, did not become blue, nor afford a precipitate even at the end of several months: a strong heat produces absolutely the same effect. From these experiments, Mr. Berthollett shews on what inaccurate information the processes recommended for purifying the alkaline prussiates were founded: for, said he, they were decomposed for the most part, instead of depriving them of a portion of Prussian blue, which chemists pretended was only accidentally mixed with it. As the prussiate of potash is a triple salt, the Prussian acid has only a very slight adhesion to the potash, and is separated by all the other acids. In proportion as the foreign acid unites to the potash, part of the Prussian acid unites to the oxide of iron, forming Prussian blue; and the other is volatilized in the state of acid, or reduced to its principles.

The iron which is precipitated by the alkaline prussiates, retains, according to Mr. Berthollett, a considerable portion of those salts: it may be deprived of them by repeated washings. These lixiviums contain the alkalis, combined with a small portion of Prussian acid; and the prussiates, with excess of alkali, are not carried off until the excess of acid in the solution of iron is carried off by the first washings; for the latter lixiviums precipitate
iron

iron in the form of Prussian blue from its solutions, though the first do not.

He did not find any sensible difference between the prussiates of potash and of soda, excepting that the latter crystallizes differently: the mineral acids disengage the Prussian acid, partly fixed in the Prussian blue, which falls down; it is this which engaged Scheele to contrive another combination, from which he could obtain the pure acid with greater facility, and upon which Mr. Berthollett makes, some observations. This process consists, as we have already observed, in boiling the red oxide of mercury in distilled water, together with Prussian blue; the Prussian acid quits the oxide of iron to unite with the oxide of mercury, with which it has a stronger attraction, and forms a soluble salt, which crystallizes in tetrahedral prisms, terminated by quadrangular pyramids, whose planes answer to the angles of the prism. Iron and concentrated sulphuric acid are added to the filtrated lixivium; the iron unites with the oxygen of the mercury, and combines with the sulphuric acid; the mercury falls down with its metallic brilliancy. Scheele afterwards distilled this mixture with a gentle heat, in order to volatilize only the Prussian acid, but he found that however slight the heat was, it always passed, mixed with a small quantity of sulphuric acid. To obviate this difficulty, he added a certain quantity of chalk to fix the sulphuric acid. Upon this addition, Mr. Berthollett,

thollett takes notice, that, as Scheele did not specify the dose of this substance, it was very easy to fail in the operation, if the chalk exceeded a little the point of saturation of the sulphuric acid; for calcareous prussiate would then be formed, which, by the law of double affinities, would decompose the sulphate of iron.

Mr. Berthollett found that the sulphuric acid disengaged only a small quantity of acid from the prussiate of mercury; that it united, for the most part, with this salt, without decomposing it, and formed a triple salt, crystallizing in small needles. According to his experiments, the muriatic acid disengages more acid from the prussiate of mercury than the foregoing, and equally forms a triple salt, capable of crystallizing in needles, and much more soluble than the corrosive mercurial muriate. Alkalis and lime precipitate this triple salt of a white appearance. Mr. Berthollett proves that the alkaline prussiates do not precipitate ponderous earth from its solutions, as Bergman had thought, but that they form triple salts: he shews that they precipitate alumine or argillaceous earth. The precipitate they form with this substance is not altered by the sulphuric acid; but, digested with the sulphate of iron, it forms Prussian blue.

The Prussian acid decomposes the oxygenated muriatic acid, absorbs its oxigene, and becomes fragrant. In this state it does not appear to have a great tendency to alkaline substances, for they scarcely diminish its smell,

smell. It does not precipitate iron of a blue, but of a green colour; and this green precipitate is soluble in acids. It becomes blue by the contact of the sun's rays, as well as by the addition of the sulphureous acid and iron. The same phenomena happen when the oxygenated muriatic acid, sulphate of iron, and prussiate of potash; are mixed together. Hence Mr. Berthollett thinks that Prussian blue is not alterable by light and by the sulphureous acid, and that it is to the absorption of oxygen that it owes its green colour, its solubility in acids, &c.

If the Prussian acid be furcharged with oxygenated muriatic acid, and afterwards exposed to the luminous rays, it assumes new characters; it no longer combines with the oxide of iron nor with water, at the bottom of which it flows in the form of oil, and with an aromatic odour. If in this state more oxygen be added, and it be left in the sun, it crystallizes in the form of small white needles. This acid, thus oxygenated, is reduced into vapours at a gentle temperature; these vapours are not soluble in water, and nevertheless are not combustible. Mr. Berthollett has not yet been able to determine what passes in this operation. Does the Prussian acid simply unite with oxygen without alteration, or is one of its principles burned? We shall more willingly adopt this last idea with him, for though the oxygen appears to be only slightly
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adherent to the Prussian acid, it can no longer be restored when it has been thus treated with the oxygenated muriatic acid.

When the Prussian acid has been put in the situation to form a green precipitate with iron, by means of the oxygenated muriatic acid, ammoniac is formed as soon as it is mixed with alkali or lime. An acid poured into this last mixture no longer restores the odour peculiar to the Prussian acid. Mr. Berthollett concludes that it is destroyed. Though he employed perfectly pure potash, yet an acid poured on after its action, produces an effervescence, and disengages the carbonic acid which has been formed in every part.

Mr. Berthollett concludes, from all these experiments, that azote, hydrogen, and carbon united in proportions and with a degree of condensation which he is unacquainted with, produce that which is called the Prussic acid. This composition explains the history of its formation in animal matters, in certain vegetable substances, and in the ammoniacal muriate, contaminated with charcoal. It likewise explains why this acid is so combustible, and detonates strongly with the several nitrates; why it affords carbonate of ammoniac by distillation; and why this salt is formed by the addition of the oxygenated muriatic acid. Mr. Berthollett doubts whether this singular combination contains oxygen; at least, says he, if the Prussian acid contain

contain it, the quantity is not sufficient to reduce the charcoal entirely into carbonic acid; for the distillation of Prussian blue affords much carbonated hydrogenous gas.

Such are the facts discovered by Mr. Berthollett: by determining the nature of colouring matter of Prussian blue, he has ascertained that it is not a true acid, though it performs the functions of an acid in all its combinations. Mr. Westrumb and Mr. Hassenfratz have discovered a small quantity of phosphoric acid in Prussian blue. The latter chemist has shewn that it is not essential to its nature.

Martial vitriol decomposes nitre very readily," &c. as in page 268.

P. 270, l. 12 (from the bottom).

Add, "And Dr. Priestley has reduced the brown oxides of iron by the contact of hydrogenous gas. These experiments do not contradict our doctrine, but, on the contrary, they serve to confirm it. In fact, the hydrogen deprives the iron of all the oxigene it was united with beyond the quantity of 0,28: this last dose is merely that which the oxigene cannot separate. Hence it is that, in these reductions, nothing but a black oxide or martial ethiops is obtained, and hence water never oxides iron, but to a black colour.*

P. 274,

* It may be observed, however, as a correction to this explanation, that Dr. Priestley not only revived iron
L 2 which

P. 274, l. 12.

Add, "if it be not extracted in the apparatus of Woulfe."

P. 276, l. 10 (from the bottom).

Instead of "renders it more probable," read, "it is proved."

—— l. 6 (from the bottom).

After the word "water," insert, "for the acid remains entire, and without decomposition, and requires the same quantity of alkali to saturate its solution as before. The solution of iron," &c.

P. 278, l. 6.

Strike out the words "and seems to deserve the name of butter of iron."

which had been calcined by the burning glass in the open air, but likewise that which had been calcined by the steam of water (vol. vi. p. 126). The fact, therefore, according to the antiphlogistic theory, will stand thus: metallic iron, in a red heat, separates the oxigene of water from its hydrogen; and this combination of oxigene and iron is again decomposed by hydrogen, which in its turn takes the oxigene from the iron. It remains, therefore, to be shewn upon what circumstance this alternate predominance of affinity to the oxigene depends. It does not appear to depend on temperature, which, as far as the facts have hitherto been examined, is much the same in both cases. Nevertheless, it must be confessed, that the difficulty is equally great in the phlogistic theory; for, in this, the calx of iron will attract first water, and then phlogiston, without any evident cause why it should do so. Future experiments must decide the question.—Note of the Translator.

P. 279, at the end of the note.

Add, "The iron ore of Framont is of the same nature."

P. 284, l. 9 (from the bottom).

Instead of the following sentence, read, "The black calx of iron is not decomposed by this gas; but the brown or red calces are easily changed, and pass to the state of black oxide, because they yield to the hydrogen the quantity of oxygen which is superabundant to that which places the iron in the state of black calx."

P. 286, l. 12 (from the bottom).

Insert, "Nevertheless, this inflammation may take place without the contact of air."

P. 290, l. 17.

In this place the Author has inserted the substance of the fifth chapter of part the second, from page 391, vol. ii. The subject begins thus:

"We have seen, at the commencement of this chapter, that iron readily absorbs charcoal by heat, and that it forms crude or cast iron and steel by its union with this combustible substance; with this difference, however, that it contains oxygen in the former of these compounds, but not in the latter. In both, the quantity of iron greatly exceeds that of the charcoal. The chemical analysis, which is so much indebted to the labours of Scheele, has

proved to this chemist, that plumbago, a mineral whose nature and rank among other minerals had long embarrassed philosophers, is nothing more than a combination of a large proportion of charcoal with a very small quantity of iron; its history must, therefore, belong to that of this metal.

Plumbago was a long time confounded with molybdena. Pott is the first who proved that neither of these substances contains lead, as was anciently thought. The many names by which," &c. as in page 392, vol. ii.

The Author has not altered the rest of the transposed chapter in any essential particular, except by adding the following lines in page 398, vol. ii. line 2, after the word "subjected:" "Since the knowledge acquired respecting carbure of iron by the researches of Messrs. Vandermonde, Monge, and Berthollett, into the different states of this metal, they have discovered that a substance is daily formed in the fusion of cast iron, which is entirely similar to the native carbure of iron or plumbago. It is rare that the ladles with which the crude iron is taken out are not covered with it. The ruins of the smelting furnaces which are repaired, exhibit it likewise in considerable masses, in a crystallized form. It is to be hoped, that at some future period it may be artificially prepared for the uses of society."

P. 293, l. 17.

Instead of the concluding paragraph of this chapter, the following is inserted :

“Iron which possesses the magnetic property, or the artificial magnet, has been reckoned among those bodies which produce very singular effects upon the animal œconomy. When applied to the skin, according to several modern authors, it mitigates pain, diminishes convulsions, excites redness, sweat, and often a small eruption : it is likewise capable of rendering epileptic attacks less frequent. It has even been affirmed, that, when left in water for twelve hours, it communicates a purgative property to that fluid. All these assertions, which are said to be founded on facts, sufficiently announce to enlightened philosophers the great difficulty which attends physical researches into the animal system. The absolute inefficacy of a body, rendered magnetical or armed with the magnetical power, upon other bodies which are not susceptible of receiving the same power, truly excludes the influence of magnetism upon the animal œconomy : those physicians who attribute such evident and striking effects, and consequently such energetic medicinal properties to the magnet, have been seduced and deceived by changes more or less sensible, which have taken place at the time of the application of the magnet, and were owing to the proper forces of the individuals,

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dividuals, and the happy efforts of nature. This opinion is 'so much the better founded, as it is more especially in the cessation or transposition of local pains or convulsions, that nature exhibits the greatest inconstancy and irregularity to observers; and that it is particularly from symptoms, more or less analogous to these, that the pretended medicinal properties of the loadstone have been inferred."

ALTERATIONS AND ADDITIONS IN
CHAPTER XVIII.

(Numbered XIX. in the new edition.)

P. 297, l. 13.

THIS paragraph is transferred to the end of paragraph numbered 3, in page 298.

P. 308, l. 12 (from the bottom).

Add, " But neither the one nor the other of these salts does any thing more than favour and accelerate the precipitation of atmospheric oxygen upon the copper, for this calcination of the metal does not take place without the tact of air.

This fact is more especially remarkable in the action of ammoniac or volatile alkali, which dissolves copper with considerable rapidity. This salt, digested upon copper filings with the contact of air, produces, at the end of a few hours," &c. as in line 8 from the bottom.

— l. 3 (from the bottom).

After the word "copper," insert, "the bottle was frequently opened."

P. 309,

P. 309, l. 15.

After the word "deeper," insert, "We manifestly see the influence of atmospheric oxygen in these phenomena."

P. 315, l. 3.

Instead of this sentence, read, "Only a small quantity of hydrogenous gas is disengaged during this solution."

P. 317, l. 2 (from the bottom).

The sentence beginning with the words "this experiment," is left out.

CHAPTER XIX.

(Numbered XX. in the new edition.)

THIS chapter is not altered.

ALTERATIONS AND ADDITIONS IN
CHAPTER XX.

(Numbered XXI. in the new edition).

P. 355, l. 7 (from the bottom).

AFTER the word "heavy," insert, "platina excepted."

P. 358, l. 3 (from the bottom).

Read, "extracted by eliquation, cupellation, and parting. The lead which flows during the eliquation of the copper, carries the silver and the gold with it. Cupellation," &c. as in line 1 of the following page.

P. 370, l. 3.

Insert, "Mr. Berthollett has discovered that the oxigene or calx of silver, precipitated from the nitric acid by lime, and digested with ammoniac, which separates it when the oxide has assumed a blackish colour, acquires the property of detonating, not only by a heat very little superior to that of boiling water, but likewise by the mere friction of any substance in the slightest manner. This fulminating silver is much more remarkable than even that of gold, whose fulmination is owing

owing to the same cause. The volatile alkali, decanted from this calx, deposits, by slow evaporation, small brilliant and lamellated crystals, which have the fulminating property, even at the bottom of the water, by simple friction."

ALTERATION AND ADDITION IN
CHAPTER XXI.

(Numbered XXII. in the new edition.)

P. 385, l. 16.

INSERT, "Late experiments have shewn, that platina exceeds gold in weight, when it has been purified by a long fusion."

P. 387, l. 13.

Read, "published in French."

ALTERATION IN CHAPTER XXII.

(Numbered XXIII. in the new edition.)

P. 413, at the end of the chapter.

THE word “ambergrease” is omitted in the enumeration; and the Author adds, that he shall arrange it among the animal products.

CHAPTERS XXIII. XXIV. XXV.
XXVI. and XXVIII. are not altered.

Chapter XXVII. upon ambergrease, is transferred to vol. iv. p. 415.

P. 443.

The supplement to the mineral kingdom is transferred to the end of the fourth volume, and composes part of the fifth volume in the new edition.

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S U P P L E M E N T

TO THE

E L E M E N T S

OF

N A T U R A L H I S T O R Y

A N D

C H E M I S T R Y.

ALTERATIONS AND ADDITIONS IN
VOLUME IV.

CHAPTERS I. II. and III. stand as in
the former edition.

C H A P T E R IV.

P. 23.

The title of this chapter is enlarged, as
follows :

“ Of

“Of the essential salts of vegetables in general, and of those which are analogous to mineral salts in particular.”

P. 24, l. 8.

The six following lines, beginning with the words “the essential,” and ending with “mineral salts,” are erased, and the following substituted: “This process cannot take place, except with regard to such crystallizable essential salts as exist, ready formed, in vegetables. But vegetable salts have been discovered which are not crystallizable; some of which cannot be extracted but by more complicated processes, because of their mixture or combination with other principles. In order to know all the salts which vegetables contain or afford, we think it proper to distinguish them into six genera.

The first contains vegetable salts analogous to those of the mineral kingdom.

The second contains the pure acids of plants.

In the third, we shall place such acid salts as are combined with a certain quantity of potash, and we shall distinguish them by the names of acidules.

The fourth genus will include those which are formed by the action of the nitric acid upon certain vegetable matters.

The

The fifth will be composed of those which owe their formation to heat.

And lastly, the sixth genus will be appropriated to such acids as are developed by a particular fermentation.

The first genus of vegetable salts. Salts analogous to those of the mineral kingdom.

The first genus of the essential salts of vegetables comprehends the neutral salts analogous to those of the mineral kingdom, which are extracted from their juices. The principal species are," &c. as in line 14, p. 24.

P. 24, l. 7 (from the bottom)

After the word "tamarisk," insert the words, "and rotten wood."

—l. 3 (from the bottom).

Add, "The existence of this last salt is doubtful; for Scheele suspects that Model mistook the calcareous oxalate, or combination of the saccharine acid with lime, for selenite."

P. 26, l. 11.

Add, "Whatever might be the result of this experiment, it will be shewn, that several salts which we have examined in the mineral kingdom, such as the vegetable alkali, the cretaceous or carbonic acid, and perhaps

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several

several others, are immediately formed in vegetables."

Here ends Chapter IV. in the new edition, and in this place is inserted a new chapter, as follows :

CHAPTER V.

Of the Second Genus of Essential Salts, or the pure Acids of Vegetables.

“WE arrange, in the second genus of vegetable essential salts, those acids which are ready formed, and are extracted in a state of purity, by very simple processes. There are four acids of this kind, namely, the citric acid, or acid of lemons, the gallic acid, the malic acid, and the benzoic acid.

§ 1. *Of the Citric Acid.*

WE call by the name of the citric acid, that pure acid which Scheele obtained from the juice of lemons.

The chemists formerly, without attending to the peculiar characters presented by this acid juice, compared it to that of tartar; and, at that time, all the vegetable acids appeared to be of the same nature. Attempts had been made to concentrate and purify the acid juice of lemons and of oranges, in order to preserve them during long voyages. The juice of the former of these fruits has a taste so strongly

acid, and it alters most blue colours so efficaciously, that its nature cannot be doubted. Mr. De Morveau has found that the specific gravity of this juice is to distilled water as 1,060 to 1.

When this expressed juice is kept, it becomes turbid, assumes a disagreeable taste, and becomes covered with mouldiness; this alteration depends on a very abundant mucilage it contains, which the chemists have endeavoured to deprive it of. Before other methods were contrived, it was preserved in glass bottles, beneath a thin covering of oil. Some persons have proposed to put sand in the vessels, others added a mineral acid: these two last processes manifestly altered its nature; the first method was preferable to them, though, even in that situation, the juice, at the end of some days, contracted a sharp, oily, and disagreeable taste. Mr. Georgius has published, in the Acts of the Academy of Stockholm in 1774, a process to concentrate the juice of lemons, and render it unalterable. He directs that the lemon-juice should be kept for some time in a cellar in bottles laid down, in order to separate part of the mucilage, and afterwards to expose it to a cold of three or four degrees below 0 on the thermometer of Reaumur: the aqueous part freezes, and takes with it, as it appears, a portion of the mucilaginous matter. Care must be taken to separate the ice from the liquid, in proportion

tion as it is formed : and the congelation must be continued until the ice which is formed becomes acid. Mr. Georgius has found, that when the juice is reduced to one-eighth of its volume, it is eight times stronger than before. A quantity of juice of lemon, which saturated thirty-six grains of potash in the ounce, saturated the same quantity of alkali, excepting one dram, after having been concentrated by frost. This acid, thus concentrated, may be employed in all domestic uses, or a dry lemonade may be made with it by mixing it with six parts of refined sugar in powder.

Lemon-juice recently expressed, and exposed for some hours to the air, at the temperature of above 15 degrees of Reaumur, deposits a white, semi-transparent, mucilaginous matter, of a gelatinous consistence : when this juice is decanted and filtered, it is much less alterable than before. The dried, mucilaginous substance does not dissolve in boiling water ; when treated with the acid of nitre, it affords azotic gas, and becomes converted into oxalic acid : it is not a gummy mucilage, but has an analogy with the vegetable gluten, of which we shall speak at the article flour.

Mr. Dubuiffon has preserved lemon-juice by an opposite process to that of Mr. Georgius. By evaporating this juice in a gentle heat long continued, the mucilage thickens, and is separated in the form of a crust or

scum, and glutinous flocks; the liquid acid is concentrated, and may be preserved a long time without alteration, in bottles well closed. Mr. Dubuiffon has observed, that the contact of the air which remains between the cork and the surface of this acid liquor concentrated by evaporation, is sufficient to separate, in the course of some weeks, flocks of a white substance, which he supposes to be glutinous, and which are collected together at the surface, where they form a coherent elastic body. The acid is not sensibly altered during this separation.

Such are the various processes which have been proposed and used before the time of Scheele, to purify and preserve lemon-juice. Although they prove that chemists had employed themselves upon this acid, yet it was not made, except for the uses of pharmacy; and the persuasion that its nature was analogous to that of the acid of tartar was such, that it had never been called in question. Stahl had asserted that lemon-juice, saturated with crabs eyes or chalk, assumed the nature of vinegar. Several chemists had attempted to combine it with alkalis, and had not been able to obtain permanent crystals from these combinations; doubtless on account of the mucilage with which it is so abundantly mixed. Mr. De Morveau assures us, nevertheless, that, after having saturated the carbonate of potash, or mild vegetable alkali, with
lemon-

lemon-juice, the solution, exposed to the air, and filtered several times, afforded him a crystallized salt in small opaque grains which were not deliquescent.

Scheele has given, in Crell's Chemical Journal for 1784, a process for obtaining the acid of lemon in a state of great purity, separated from the mucilage and extractive matter, which alter this fruit in the expressed juice, and under a concrete form : alcohol, which he at first used to separate the mucilage by coagulation, did not succeed ; for after having filtered the thickened fluid, evaporation did not afford crystals. He availed himself of the process he had discovered several years before, to purify the tartareous acid, and he succeeded, in obtaining the pure citric acid in a concrete state. The following is the process : Boiling lemon-juice was saturated with powdered chalk ; the acid formed with the chalk a salt of difficult solubility, and the supernatant water retained in solution the mucilaginous and extractive substances ; the precipitate was washed with warm water until the fluid came off colourless : it is nearly as soluble in water as the sulphate of lime or selenite ; it was afterwards treated with the quantity of sulphuric acid necessary for the saturation of the dose of chalk employed, and diluted with ten parts of water : this mixture was boiled for several minutes. After cooking, it was filtered ; the sulphate

of lime remained on the filtre, and the evaporated liquid afforded a concrete and crystallized acid. In this operation, it is better, according to the remark of Scheele, that there should be an excess of sulphuric acid, than to leave a small quantity of lime, which prevents the citric acid from crystallizing: the excess of sulphuric acid remains in the mother water.

The citric acid thus prepared is very pure and concentrated; its taste is strongly acid, and it reddens all the blue vegetable colours which are capable of that change. Fire decomposes and converts it into an acidulous phlegm, gaseous carbonic acid, and carbonated hydrogenous gas; a small portion of charcoal remains in the retort: its crystals are not altered in the air; it is very soluble in water, and its solution is decomposed by a true putrefaction, which is very slow. United with earths and alkalis, it forms the citrates of alumine, of barytes, of magnesia, of lime, of potash, of soda, and of ammoniac, whose properties have not yet been well ascertained, but which are known to be different from all other neutral salts. The nitric acid does not convert it into oxalic acid, as it does several other vegetable acids; it seems to be one of the most powerful of these acids; it acts on several metallic substances by the assistance of water, and notably on zinc, iron, copper, &c.

Its

Its affinities, pointed out by Bergman, are in the following order: Lime, barytes, magnesia, potash, soda, ammoniac. Mr. Bresley, of Dijon, has determined its attractions somewhat differently: according to him, barytes holds the first rank, lime the second, and magnesia the third; the alkalis come afterwards. It follows, from the researches of these two observers, that the three alkaline earths are preferred to alkalis by this acid.

The uses of the citric acid are sufficiently numerous. With water and sugar it forms a very agreeable drink, known under the name of lemonade. It is employed in medicine as refreshing, cooling, antiseptic, antiscorbutic, diuretic; more particularly it corrects acrid bile. It is sometimes used as a slight escharotic in scorbutic ulcers, darts, eruptions, and spots on the skin. When concentrated by the process of Mr. Georgius, or Mr. Dubuiffon, it may be used in sea voyages, and will be a great resource in remote expeditions of this kind.

§ 2. *Of the Gallic Acid.*

WE give the name of gallic acid to that which is extracted from the nut-gall, which grows on the oak by the puncture of an insect. This acid exists in general in greater or less quantities, in all vegetable, austere, or astringent substances; such are the woods of
the

the oak, the ash, the willow, the barks of the same trees, the quinquina, simarouba, pomegranate, sumach, tormentilla; the nuts of cypress; the husks of nuts; the stem and leaves of the marsh iris, the strawberry plant, the nenuphar, &c.

Chemists were formerly acquainted, in this substance (which they distinguished by the name of astringent principle), with no other property than that of precipitating the solutions of iron in acids of a black colour, or of forming ink, which, indeed, is an exclusive and very characteristic property. Messrs. Macquer, Monnet, Lewis, Cartheuser, and Gioanetti, made experimental inquiries into the mode of action of this principle upon iron. Mr. Monnet had more particularly remarked, that the nut-gall and astringent vegetable juices acted immediately on iron, and gave it a black colour. Mr. Gioanetti had observed, that the precipitate, or atramentary fecula, was not attracted by the magnet, and that the iron was not in the metallic state, as had been supposed before his time. These observations ought to have led to the notion that the astringent principle of the nut-gall was an acid, or at least that it acted as an acid in chemical operations. The academicians of Dijon are, however, the first who, after the above-mentioned authors, began to perceive in their experiments that the astringent principle was an acid. These learned men have shewn,

1. That

1. That the product of the nut-gall by distillation blackened the solution of sulphate of iron or martial vitriol. 2. That one ounce of this excrescence affords a tincture to cold water, from which $3\frac{1}{2}$ drams of extract are obtained by evaporation. 3. That this infusion reddens turnsole and blue paper. 4. That the same principle is soluble in oils, in alcohol, and in æther. 5. That the acids dissolve it without altering it, and without depriving it of the property of precipitating iron of a black colour. 6. That this solution in water precipitates alkaline sulphures. 7. That it completely decomposes all metallic solutions, and colours their calces at the same time that it combines with them. 8. Lastly, that it dissolves iron in the direct way, and reduces silver and gold, after having separated them from their solvents. Such are the important facts announced by the academicians of Dijon, several of which were, indeed, before perceived by some chemists, but were not considered by any of them as indications of the acidity of this principle, excepting by these philosophers.

Since their time, Scheele has not only shewn that all austere and astringent plants exhibit signs of acidity, but he has likewise discovered and described a process to obtain this vegetable, pure and crystallized.

Six pounds of distilled water are poured upon one pound of nut-galls in powder; this
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is left to macerate during fifteen days, at the temperature of between 16 and 20 degrees of Reaumur ; it is then filtrated, and the fluid is left in a tureen of stone ware, or a large glass capsule. It is suffered to evaporate slowly by exposure to the air. A mouldiness and thick pellicle is formed, which appears as if glutinous ; very abundant mucilaginous flocks fall down ; the solution then no longer possesses a very astringent taste, but is very sensibly acid ; and after two or three months exposure to the air, a brown crust is observed adhering to the sides of the vessels, and covered with granulated, brilliant, yellowish, grey crystals ; the same crystals likewise exist in large quantities beneath the thick pellicle which covers the liquor : the fluid is then decanted, and alcohol is poured on the deposit of pellicle and of crystalline crust, and heated. This solvent takes up the whole of the crystallized salt, but does not touch the mucilage. By evaporation of this spirituous solution, the pure gallic acid is obtained in small granulated crystals, of a brilliant appearance, and slightly yellowish grey colour.

The gallic acid, thus purified, has a sour and slightly astringent taste : it precipitates martial vitriol, and all other salts of iron, in a very beautiful and bright black ; it strongly reddens the tincture of turnsole ; heated with the contact of air, it swells up and takes fire, emitting a somewhat agreeable smell, and leaves a charcoal

coal of difficult incineration. When distilled by a gentle heat, part rises, dissolved in the water of crystallization; another part rises in small silky crystals, without decomposition; a strong fire separates some drops of oil, carbonic acid gas or fixed air, and carbonated hydrogen, or inflammable air contaminated with fixed air. The nut-gall, distilled in substance, affords a small quantity of concrete salt, analogous to the sublimed gallic acid.

The gallic acid requires 24 parts of cold water, but no more than three of boiling water to dissolve it: repeated solutions and crystallizations do not render it sensibly whiter. Alcohol dissolves it much more effectually; four parts of this liquid are sufficient when cold, but when boiling it is soluble in an equal weight of that fluid.

This acid disengages the carbonic acid from earthy and alkaline bases, when its action is assisted by heat.

With barytes, magnesia, and lime, it forms salts, soluble in water, more especially by the assistance of an excess of these bases. Vegetable alkali, soda, and volatile alkali, unite very readily with it, and form salts, whose properties are not yet known.

The nitric acid converts the gallic acid into the oxalic acid, or acid of sugar.

The gallic acid precipitates gold from its solvent in the form of a brown powder, and part of the metal appears at the surface in a
brilliant

brilliant and metallic pellicle. Silver is precipitated of a brown colour, and a film of this metal reduced, soon covers the surface of the liquor. Mercury is precipitated of an orange yellow; copper of a brown colour; iron of a beautiful bright black; and bismuth of a yellow lemon colour. The solutions of platinum, zinc, tin, cobalt, and manganese, are not altered by this acid.

Such are the properties discovered by Scheele in the gallic acid, prepared as has been described above: they are sufficient to cause this salt to be considered as a peculiar acid, different from all others. Its intimate nature, and the proportion of its principles, have not yet been determined. Mr. De Morveau has obtained from it a resin, which he supposes to be the acidifiable base, whose union with oxygen forms this acid.

The uses of the nut-gall for dying black are sufficiently known. We shall only add, to what we have already said at the article of iron, that, by employing the purified gallic acid for the preparation of ink, this fluid is very beautiful, very black, and may be kept a long time without alteration.

§ 3. *Of the Malic Acid.*

WE give the name of malic acid to a peculiar vegetable acid which Scheele extracted from

from the juice of several fruits, and which he found more particularly abundant in apples.

To obtain this acid, the juice of four apples is expressed, and saturated with vegetable alkali; to this liquor a solution of acetite of lead or sugar of saturn is added; a double decomposition takes place, the acetic acid combines with the alkali, and the malic acid with the calx of lead; the metallic salt or malate of lead falls down: this precipitate is washed and treated with the vitriolic acid, diluted with water; sulphate of lead is formed, and the malic acid remains in the liquor. It is necessary to add a sufficient quantity of sulphuric acid to decompose the whole of the malate of lead, which is known by the fresh acid taste of the liquor.

This acid possesses the following properties: It cannot be obtained in the concrete form. With the three alkalis, it forms deliquescent neutral salts. With lime it forms a salt which affords small irregular crystals, soluble in boiling water, in vinegar, and in the malic acid itself. With clay it forms a salt of very difficult solubility. With magnesia, a deliquescent salt. It dissolves iron; and this solution is brown, and does not afford crystals. With zinc, which it dissolves well, it affords a salt in very fine crystals. The nitric acid changes it into the oxalic acid, or acid of sugar. It precipitates the nitrates of mercury, of lead, of silver, or of gold, in the metallic state. The cal-

calcareous malate decomposes the ammoniacal citrate, or combination of the volatile alkali with the acid of lemons, and calcareous citrate is formed, which is insoluble in boiling water and in the vegetable acids. The solution of calcareous malate in water is precipitated by alcohol. Lastly, the malic acid is readily destroyed by fire, which changes it into the carbonic acid or fixed air: this last partly saturates the bases of the malates, which are decomposed by heat. These are the properties which establish the peculiar characters of this acid.

Scheele found it almost pure, or mixed with a small quantity of citric acid, or acid of lemons, in the juice of apples, barberries, elderberries, flocs, the fruit of the service-tree, and damsons.

He found it in combination with half its weight of acid of lemons in gooseberries, cherries, strawberries, raspberries, and blackberries.

And, lastly, he obtained it from sugar by the nitric acid; and Mr. De Morveau remarks, that the malic acid appears before the oxalic acid, or acid of sugar.

When four fruits contain, at the same time, the citric acid and the malic acid, the following is the process which Scheele has followed to separate them, and obtain the latter in a state of purity. The juice of gooseberries, saturated with chalk, affords calcareous citrate, which
falls

falls down because insoluble; the supernatant liquor holds in solution the calcareous malate, which is separated by alcohol: but as it still remains in combination with a portion of mucilage, Scheele had recourse to another method to obtain it pure. He evaporated the juice of gooseberries to the consistence of syrup, upon which he poured alcohol, which dissolved the acid without touching the mucilage, and he separated the latter by the filtre; the liquor being filtrated, he evaporated the alcohol, and saturated the acids with chalk: the portion of citric acid was precipitated in the form of calcareous citrate, and the calcareous malate remained dissolved. This new alcohol precipitated it from its solvent, and Scheele obtained the malic acid by dissolving this salt in water, precipitating this solution by the acetite or acetous salt of lead, and by decomposing the malate of lead by the sulphuric acid. The malic acid was disengaged in the supernatant liquor.

§ 4. *Of the Benzoic Acid.*

IT has been known, since the time of Blaise de Vigenere, who wrote at the commencement of the last century, that benjamin affords, by distillation, an acid salt, crystallized in very fragrant needles, of an acrid taste, which in pharmacy are distinguished by the name of flowers of benjamin. Chemists formerly

merly supposed it to be a mineral acid modified; but at present, the particular and characteristic properties which have been distinguished in it do not permit us to doubt but that it is a vegetable acid, different from all other acids.

This acid exists in benjamin, balsam of Peru and of Tolu, storax, liquid amber, and the vanilla, around which it crystallizes: Scheele likewise found it in sugar of milk, and extract of urine. It will be seen, at the article Benzoin, that the simple process formerly employed in obtaining it, consisted in sublimation by a gentle fire. Geoffroy discovered, in 1738, that it might be extracted by water, and that this substance was contained ready formed in the benzoin. I have extracted it, by the same process, from balsam of Peru, storax, and the husks of vanilla; but this method affords only a small quantity, because the resin of benzoin, which does not mix with water, envelopes and defends a great part of the acid salt.

In the year 1776, Scheele published, in the Memoirs of Stockholm, important observations upon the benzoic acid. 96 parts of benzoin afforded, by sublimation, between 9 and 10 parts of this sublimed salt, which is very far from the estimation of Spielman, who affirmed, that he obtained $\frac{1}{4}$ of the weight of the benzoin made use of. It appears, that the chemist of Strasburg estimated it when mixed with much empyreumatic oil. Scheele boiled

water upon benzoin in powder, mixed with chalk, and filtered the liquor, which afforded no salt by cooling. The sulphuric acid being poured upon this liquor, separated the benzoic acid in powder, and shewed that this acid had united to the base of the chalk, and had formed a neutral salt, soluble in water; nevertheless, the quantity of concrete acid, precipitated by this process, was not more considerable than that which is obtained by simple lixiviation. Scheele supposed that he should obtain more by employing a substance capable of acting upon the resin, and facilitating the separation of the salt: the vegetable alkali did not answer this purpose; the resin united at the surface of the fluid in the form of a dense and tenacious oil, which afforded no hopes of a sufficiently complete separation of the acid. Quick-lime succeeded better, and the following process invented by him is used: 4 ounces of quick-lime are extinguished in 12 ounces of water, and 8 pounds of water are added when the ebullition has ceased; 6 ounces of this lime-water are poured over 1 pound of benzoin in powder, with sufficient agitation to mix these two substances; the whole of the lime-water is added by degrees. This mixture by parts prevents the benzoin from uniting into a mass. The liquor is heated over a gentle fire for half an hour, with continual agitation; it is then taken from the fire, and suffered to settle for several hours; the clear

N 2

liquor

liquor is then decanted, and 8 pounds of water thrown on the residue, which, after being boiled for half an hour, is suffered to subside, and when clear is added to the preceding fluid. This washing and ebullition is repeated twice more, and the washing is ended by pouring hot water through the residue upon a filtre: all these waters are afterwards reduced to two pounds by evaporation: a small quantity of resin separates; the evaporated liquor being cooled, muriatic acid is added drop by drop, until no more precipitate falls down, and the liquid exhibits a taste sensibly acid; the salt of benzoin is the precipitate in the form of a powder; it isedulcorated on the filtre. If crystals be desired, it may be dissolved in 5 or 6 times its weight of boiling water, which being filtered through a cloth, and suffered to cool slowly, the salt is deposited in flat and very long prisms.

In this process, the lime absorbs the benzoic acid, and forms with it calcareous benzoate, which is very soluble: the resin separates from this salt, which has but a small affinity with it; the muriatic acid, whose attraction for lime is stronger than that of the benzoic acid, seizes the earth, and separates the vegetable acid. The liquor reduced to two pounds by evaporation, is not sufficient to hold the acid in solution, and almost the whole is deposited. The calcareous benzoate has not the smell of benzoin; but as soon as

the benzoic acid is separated by the muriatic acid, it resumes the lively smell which is peculiar to that balsamic substance. By this process Scheele obtained 12 or 14 drams of benzoic acid from one pound of benzoin; whereas sublimation affords no more than 9 or 10. He informs us, likewise, that the purification of this salt by hot water and by crystallization, causes the loss of a great quantity, and that this purification is not necessary for pharmaceutic uses. In fact, this salt, well crystallized, is very difficult to reduce to powder, and the purification has no other object than to separate about two grains of resin in the pound of benzoin. Lastly, he remarks that the filtration of this acid dissolved in water cannot be made but through a cloth, as it separates quickly, and in proportion as the liquor cools, the salt closes the pores of the paper, and the filtration cannot proceed.

Since these experiments were made by Scheele, Mr. Lichtenstein has published, in Germany, Observations on the Benzoic Acid, in which he assures us that sublimation affords more of this acid than the process with lime-water; but I think, with Scheele and Mr. De Morveau, that this cannot be understood but of the purified salt.

The pure benzoic acid has a slightly sour, penetrating, hot, and acrid taste; its smell is but slightly aromatic, and it reddens the colour of turnsole very well.

Heat volatilizes it, and at the same time singularly increases its odour. If it be exposed to the action of the blow-pipe in a silver spoon, it liquefies, according to the observation of Mr. Lichtenstein, and evaporates without enflaming. If it be suffered to cool, it forms a solid crust, whose surface presents traces of crystallization in divergent rays: it does not burn with flame, unless it be in contact with bodies which are themselves strongly inflamed; the contact of a burning coal only causes it to sublime rapidly.

Air does not appear to have any action upon this acid; for, after having been preserved 20 years in a glass vessel, it was very pure, and had lost nothing of its weight; its smell is dissipated, but it recovers it again by heat.

The benzoic acid is but sparingly soluble in cold water: from the experiments of Messrs. Wenzel and Lichtenstein, it appears that 480 grains of cold water dissolve no more than one grain, and that the same quantity of boiling water can dissolve 20 grains, of which 19 separate by cooling. Bergman affirms that boiling water can take up $\frac{1}{24}$ of its weight, and that at the mean temperature it dissolves scarcely $\frac{1}{500}$.

The benzoic acid unites to all the earthy and alkaline bases, and forms with them the benzoates of alumine, of barytes, of magnesia,

nesia, of lime, of potash, of soda, and of ammoniac ; the characteristic properties of these several combinations are not known, nor the various attractions of this acid for the bases. Mr. Lichtenstein affirms that it prefers the fixed alkalis, and even ammoniac, to the aluminous, magnesian and calcareous earths : but more numerous experiments are required to determine exactly the order of these attractions, more especially as Bergman arranges them differently : according to him, lime separates the alkaline bases, and barytes separates lime : it disengages the carbonic acid from all these bases.

The concentrated sulphuric acid readily dissolves it without heat, and without noise, according to the same chemist ; nevertheless it passes to the state of sulphureous acid. The benzoic acid may be separated without alteration by water.

The nitric acid dissolves it in the same manner, and water equally disengages this salt unaltered. Mr. De Morveau has augmented the action of these two bodies by heat, and the nitrous gas was not disengaged but towards the end ; and the benzoic acid was sublimed entire and without alteration. However, Mr. Hermstadt affirms that by employing the concentrated nitrous acid, the benzoic acid becomes fluid, more fixed, and assumes the characters of the tartareous or oxalic acid ; but this result, which is itself

very uncertain, requires additional researches. That which appears to be the most certain respecting this acid is, that it differs by its nature and properties from all the other vegetable acids, and that it retains an essential oil, which gives it smell, volatility, combustibility, and solubility in alcohol."

ALTERATIONS AND ADDITIONS IN
CHAPTER VI.

THIS chapter is partly new and partly transposed: it immediately follows the preceding chapter, and is entitled,

“Concerning the vegetable acids, which are partly saturated with potash; and concerning the same acids in a state of purity.”

After which, the body of the chapter proceeds as follows:

“In the fourth chapter we have distinguished a peculiar species of vegetable acids, which we have observed are partly combined with potash, or the vegetable alkali. We are acquainted with two acids in this situation, namely, the acid of tartar, and that of sorrel. We distinguish these partly neutralized acids by the names of acidules; the one tartareous, and the other pure.

§ 1. Concerning the tartareous acidule or tartar, and the pure tartareous acid.”

In this place the matter of Chapter XXII. page 178, of the present volume, is inserted, with the alterations which we shall proceed to note.

P. 179, l. 5.

Add, "Many other chemists have since found it ready formed in several fruits."

P. 182, at the bottom.

Add, "It appears that this formation of ammoniac, or volatile alkali, is owing to the azote of the potash, which unites to the disengaged hydrogen of the oil."

P. 183, l. 10.

Add, "If it be left exposed to the air, it becomes turbid, and after some time deposits mucilaginous flocks. The acid is decomposed, and the fluid is found to contain nothing but carbonate of potash, or mild vegetable alkali. Mr. Demachy first observed this decomposition. Messrs. Spielman and Corvinus have likewise busied themselves on this subject; but Mr. Berthollett has made experiments which are still more accurate than those which preceded him. He has observed, that 2 ounces of the tartareous acidule required 18 months for their entire decomposition; that it afforded $6\frac{1}{2}$ drams of carbonate of potash, still oily, and mixed with a small quantity of carbone; that this quantity of alkali answered with sufficient exactness to that which was afforded by the acidule, by combustion, and calcination. The alkaline residue of the distillation, and this spontaneous decomposition, prove, therefore,

fore, that the tartareous acidule contains nearly $\frac{1}{4}$ of its weight of potash."

P. 183, l. 10 (from the bottom).

Add, "These phenomena depend on the state of the tartareous acid, which is partly saturated in this vegetable acidulous salt."

P. 184, l. 17.

The remainder of this paragraph, from the word "Bergman," to the word "vegetables," upon page 185, is omitted.

P. 186, l. 12.

Insert, "This solution is decomposed during the course of some months, and leaves the tartareous acidule combined with the carbonic acid."

P. 188, l. 2.

Add, "When it is prepared, it seems that the portion of tartrate of potash, whose union with the tartareous acid constitutes the acidule or cream of tartar, remains in the mother water."

P. 193, l. 14.

Add, "It appears that the tartrate of antimony or antimoniated tartar, contains the portion of tartrate of potash, which forms part of the tartareous acidule, and that it is a kind of triple salt."

After

After page 196, the Author proceeds to add the following new matter in the present chapter, concerning the tartareous acid.

“ Such are the properties of the native tartareous acidule, or of the tartareous acid combined by nature with a certain quantity of potash: it was necessary to examine it with care, because this substance is very useful, and much employed in this state. But this is not the pure tartareous acid, whose properties and characters are of equal importance to be known. Mr. Retzius has published, in the *Memoirs of Stockholm* for 1770, a process, invented by Scheele, for the extraction and purification of this acid. Washed chalk is thrown into a solution of 2 pounds of cream of tartar in boiling water, until there is no longer any effervescence nor acid at liberty; somewhat more than $\frac{1}{4}$ of the weight of the cream of tartar is required: the precipitate of calcareous salt which is formed must be then collected on the filtre, and washed with warm water; it commonly amounts to 32 or 33 ounces, on account of the water it retains. The liquor decanted from this precipitate affords, by evaporation, nearly the half of the weight of the cream of tartar, which has not been decomposed: 9 $\frac{1}{4}$ ounces of dense vitriolic acid, diluted with 5 pounds 5 ounces of water, is poured on the calcareous salt of tartar, and the mixture is left to digest for 12 hours, being

being agitated from time to time. The liquor is then decanted from the selenite or vitriolic salt of lime; and the water is evaporated after having ascertained that it does not contain sulphuric acid. For this purpose, a few drops of acetite of lead, or sugar of lead, are added; if the precipitate which is formed be entirely soluble in vinegar, the lixivium does not contain sulphuric acid; if it is not soluble in this fermented acid, it contains the vitriolic acid, of which it may be cleared by digesting the liquor on a certain quantity of calcareous tartrate. Lime may be used instead of chalk, to obtain the tartareous acid; but as this alkaline earth decomposes the tartrate of potash contained in the tartareous acidule, the lixivium contains only alkali instead of the tartrate of potash, as in the former process. The use of quick-lime in this decomposition affords a great quantity of acid, because this earth decomposes twice its weight of tartareous acidule or cream of tartar.

The pure tartareous acid obtained in the liquid state by either of the above-described processes, must be evaporated to dryness; afterwards re-dissolved and crystallized, either by gentle evaporation, according to Mr. Pöcken, or by cooling the liquor evaporated to the consistence of clear syrup, according to Bergman. It is obtained in the form of small needles acutely pointed, or fine prisms, whose form is difficult to be determined.

Bergman

Bergman describes them as small diverging leaves; Mr. Retzius compares them to hairs intertwined together. They are at first very white, but those which are obtained towards the end are yellow.

The crystallized tartareous acid melts, fumes, blackens, and even takes fire by the contact of ignited bodies. By distillation it affords, like the tartareous acidule itself, an acid phlegm, a small quantity of oil, and much gaseous, carbonic acid, mixed with carbonated hydrogenous gas. The charcoal which remains, contains neither acid nor alkali; which proves that this last is not formed by the decomposition of the tartareous acid by fire. This acid, though purified, is always oily. It is for this reason that we distinguish it, in the new nomenclature, by the name of tartareous acid, and its salts by that of tartrites.

It is unalterable in the air, is much more soluble than cream of tartar; its taste is very penetrating; it reddens the tincture of violets, and likewise that of turnsole; it perfectly dissolves alumine or clay, and forms with it an aluminous tartrate, which assumes a gummy or mucilaginous appearance by evaporation.

In combination with magnesia, the pure tartareous acid likewise forms a kind of gelatinous matter instead of crystallizing.

With lime it forms a salt which is scarcely soluble.

If a small quantity of vegetable alkali be
poured

poured into its solution, crystals of the tartareous acidule, or cream of tartar, fall down. This discovery of Scheele and Bergman throws the greatest light on the nature of this vegetable salt: there no longer remain, as Macquer observed, any inquiries to be made concerning the composition of cream of tartar; it is known to be the tartrate of potash with excess of acid. But what is most singular is, that this acid, which is very soluble, immediately loses this property when it is about half saturated by the alkali, which is, nevertheless, itself very soluble. This fine experiment likewise proves that the tartareous acid is not at all altered by the process of Scheele, since it forms, with about $\frac{1}{4}$ or $\frac{1}{3}$ of its weight of potash, an acidulous salt, which is perfectly similar to that formed by nature. If the proportion of potash be increased, a neutral salt is formed, which is perfectly saturated and soluble: it is the tartrate of potash or vegetable salt.

The tartareous acid united to soda constitutes a neutral crystallizable salt, or tartrate of soda very pure. With ammoniac it likewise affords an ammoniacal tartrate, which is crystallizable. Mr. Retzius affirms, that if the tartareous acid be combined with a quantity of ammoniac, much less than is necessary to saturate it, an ammoniacal tartareous acidule is formed, which is of sparing solubility, and crystal-

crystallizes like the tartareous acidule of potash, or common cream of tartar.

Though the tartareous acid has less affinity with alkalis than the mineral acids, yet these, by decomposing the tartrites of potash and of soda, do not completely separate their bases, but disengage the tartareous acid in the state of acidule of potash or of soda. The disengaged tartareous acid itself decomposes in part the sulphate, nitrate, and muriate of potash or Glauber salt, common nitre, and salt of Sylvius; and separates the portion of alkali which is required to convert it into the state of tartareous acidule or cream of tartar. It does not produce the same effect upon the nitrate and muriate of soda.

Mr. Hermstadt affirms, that the tartareous acid becomes the oxalic acid by means of the nitrous acid. Bergman could not produce this change: but his want of success was probably owing to his not having employed a sufficient quantity of nitrous acid. As nitrous gas is afforded during this conversion, it appears that the oxalic acid differs from the tartareous acid only in containing a greater quantity of oxigene.

The tartareous acid has no action upon platina, gold, and silver; it dissolves their oxides or calces; it acts only insensibly upon copper, lead, and tin; it dissolves their oxides, and deprives that of lead of its red colour.

It

It dissolves iron with a very violent effervescence.

It produces no alteration whatever in antimony in the metallic state, but it dissolves the vitreous calces of that semi-metal very well.

It takes lime from the nitric, muriatic, acetic, formic, and phosphoric acids.

It precipitates the nitric solutions of mercury, the muriatic solutions of lead, &c.

Its attractions, pointed out by Bergman, are in the following order: Lime, barytes, magnesia, potash, soda, ammoniac or volatile alkali, alumine or argillaceous earth, the calces of zinc, iron, manganese, cobalt, nickel, lead, tin, copper, bismuth, antimony, arsenic, silver, mercury, gold, platina; water and alcohol.

§ 2. Salt of sorrel of commerce, or the oxalic acidule, is obtained in great quantities in Switzerland, in the Hartz, in Thuringia, and Swabia, from the juice of sorrel, called *oxalis acetosella*. One hundred pounds of this plant afford, according to Mr. Savary, fifty pounds of juice by expression; and this affords only five ounces of concrete salt, by evaporation and crystallization. In commerce, the salt of sorrel of Switzerland, which is the finest and whitest, is distinguished from that of the forests of Thuringia, which is foul and yellowish.

It has long been known that the juice of sorrel affords a neutral salt by evaporation. Duclos mentions it in the Memoirs of the

Academy for 1668. Junker likewise speaks of it. Boerhaave has described, with much care, the process proper for obtaining this salt, which he compares to tartar. Margraaf discovered the presence of potash in the oxalic acidule, as well as in that of tartar. But the accurate knowledge of the nature of this salt has been acquired in consequence of the labours of Messrs. Savary, Wenzel, Wiegleb, Scheele, and Bergman.

The oxalic acidule has the form of small white, opaque, needle-formed, or lamellar crystals. Their exact form has not yet been determined, though Capeller and Ledermuller have represented it as seen in the microscope. Mr. de Lisle defines them as very long parallelopipedons. These are assemblages or groups of thin and long plates joined at one end and separated at the other.

Its taste is eager, penetrating, and at the same time rough or austere. It strongly reddens the tincture of turnsole and blue paper; 480 grains of this acidule distilled in a retort by a well-regulated fire, by Mr. Wiegleb, afforded 150 grains of very acid phlegm, without smell or colour. There remained 160 grains of a grey salt, from which 156 grains of vegetable alkali were obtained. About four grains of concrete acid salt likewise sublimed to the neck of the retort, but there did not pass one single drop of oil.

The loss in this distillation was 166 grains; but

but as Mr. Wiegleb does not mention the elastic fluids which must have been disengaged in this analysis, it is probable that the loss is owing to the water in vapours, and carbonic acid gas, mixed with a small quantity of hydrogenous gas and carbone. From this analysis, compared with that of the tartareous acid, we see that the oxalic acidule is not so oily as this last; and accordingly it is found, that the liquid acid obtained in this distillation, is the pure oxalic acid; whereas the tartareous acidule, treated by the fire, affords an acid which is altered and is different from the tartareous acid itself. We distinguish it by the name of the pyro-tartareous acid. It is on account of this smaller quantity of oil, contained in the acid of sorrel, that we have distinguished it by the names of oxalic acidule and acid; whereas the more oily acid of tartar has been named, according to the rules of the methodical nomenclature, *tartareous acid*.

The oxalic acidule, exposed to the air, suffers no change when it is pure: it is more soluble than the tartareous acidule. According to Mr. Wiegleb, one dram of the oxalic acidule of Switzerland requires no more than six drams of boiling water, but it is precipitated entirely by cooling, notwithstanding the addition of six drams of cold water. According to Mr. Wenzel it is much more soluble; for, by his experiments, 960 parts of boiling water take up 675 of this salt; but

its solubility appears to vary according to its greater or less state of acidity, which no doubt depends on the plant from which it is extracted.

The oxalic acidule unites to barytes, magnesia, soda, ammoniac, and forms with them triple salts. Lime decomposes it, by seizing its whole acid, as well that which is at liberty, as that which is combined with potash: 100 grains of chalk decompose 137 grains of the oxalic acidule. The precipitate of calcareous oxalate which is deposited weighs 175 grains; the supernatant liquor affords 32 grains of carbonate of potash by evaporation. This process cannot be used to prepare the pure oxalic acid in the same manner as the tartareous acid is obtained in a state of purity, because the calcareous oxalate cannot be decomposed by the sulphuric acid, as the calcareous tartrite is: on the contrary, the attraction of the oxalic acid for lime is so strong, that it takes it from all other acids; and a sure means of ascertaining the purity of the oxalic acidule, or salt of sorrel of commerce, consists in pouring its solution into water, charged with a solution of calcareous sulphate or selenite. If this acidule be truly extracted from sorrel, an abundant precipitate is afforded.

The sulphuric acid facilitates the disengagement of the oxalic acid from this acidule by means of heat, according to Mr. Wiegleb. The nitric acid decomposes the acidule, and
separates

separates the alkali with much greater difficulty from this than from the tartareous acidule, according to the researches of Margraaf.

The oxalic acidule attacks iron, zinc, tin, antimony, and lead; it dissolves the oxides of all the other metals, and forms with them triple salts, which are crystallizable and not deliquescent, in which the potash or vegetable alkali remains constantly united to the acid: it precipitates the nitric solutions of mercury and of silver. Mr. Bayen, by evaporating the liquor which flows above these precipitates, obtained common nitre, and confirmed the presence of alkali in this acidule.

To prepare the oxalic acid, and deprive it of the portion of potash which renders it acidulous, we may, as has already been shewn, avail ourselves of distillation; but this process affords only a small quantity; and that of Scheele, which is much more certain and easy, is preferable. The oxalic acidule, or salt of sorrel, is saturated with volatile alkali. Into the solution of this triple salt, composed of the acid with the volatile and vegetable alkalis, the nitrous salt of barytes or ponderous earth is poured. A precipitate is formed of oxalate of barytes, and the nitric acid retains the alkalis. The barytic salt, when well washed, is decomposed by the addition of vitriolic acid, which combines with the ponderous earth, and remains insoluble at the bottom. The fluid being decanted, is to be essayed by the

addition of a small quantity of barytic oxalate, dissolved in boiling water, to separate the portion of vitriolic acid which may be contained in it; and when no more precipitate is afforded, the liquid, which contains the pure oxalic acid, may be decanted. This being duly evaporated, affords, by cooling, the crystallized acid in quadrilateral prisms, whose faces are alternately broad and narrow, and are terminated by dihedral summits. These crystals often have the form of square or rhomboidal plates.

This concrete acid has a very penetrating sour taste; it reddens all blue colours: one grain of the salt gives to 3600 grains of water, the property of reddening paper tinged with turnsole.

The concrete oxalic acid, exposed to a mild heat, becomes dry, and covered with a white crust; soon afterwards it is reduced to powder, with the loss of three tenths of its weight. By distillation in a retort with a stronger heat, though still moderate, it liquefies, becomes brown, boils up, affords an acidulous phlegm, sublimes in part without alteration, at the same time that a mixed gas, consisting of carbonic acid and inflammable or hydrogenous gas, is disengaged.

If a very strong heat be applied, more gas, less of concrete sublimed acid, and more acidulous phlegm which is not crystallizable, are afforded: there remains at the bottom of the retort

retort a grey or brown mass, forming $\frac{1}{30}$ of the acid employed. If laid upon ignited charcoal in the air, it exhales in a very acrid white fume, which strongly irritates the lungs, and leaves only a white residue without any coaly matter. Such is the result of the decomposition of the oxalic acid by heat, as observed by Bergman. The Abbé Fontana obtained nearly double the product of gas; but this depends, as we have already shewn, upon the stronger heat he gave, with the intention of completely decomposing this acid.

The concrete oxalic acid, exposed to a moist air, remains deliquescent, but it rather becomes dry in a dry atmosphere: cold water dissolves half its weight. When the crystals of this acid are thrown into cold water, they produce a slight noise, which indicates a sudden breaking of the particles. The specific gravity of this cold solution is 1,0593, according to Mr. de Morveau. If the water of solution be evaporated, no acid vapour arises, even by ebullition. Boiling water dissolves its own weight of this concrete acid salt. One half is precipitated in crystals by cooling. The oxalic acid dissolves the base of alum," &c.

In this place is inserted the matter from page 36 of the present volume, line 12, to line 2, on page 40; with the following additions.

P. 37, l. 12.

Add, "If the pure oxalic acid be added,
O 4 drop

drop by drop, a precipitate is soon formed, which is known to be the oxalic acidule or salt of ferrel, analogous to that of commerce."

P. 37, l. 17.

Add, "An excess of acid forms an acidulous oxalate of soda, of sparing solubility."

—— l. 23.

Add, "An excess of this acid, poured into the solution of this salt, precipitates an ammoniacal acidulous oxalate, which falls down in crystals much less soluble than the pure neutral salt."

—— l. 6 (from the bottom).

Add, "which reduces it to carbonic acid."

At the end of the paragraph, line 2, p. 40, the extract from chapter V. of the old edition terminates, and the rest of this sixth chapter of the new edition is as follows :

"This celebrated chemist made all these combinations by employing the artificial oxalic acid, prepared by the nitric acid and sugar.

Sugar, as well as all mucilages, extracts, mild oils, and flour, afford, when treated by the nitrous acid, an acid perfectly similar to the pure oxalic acid, as Scheele has ascertained. All these matters, and even a great number of animal substances, as Berthollet has discovered, contain, therefore, the oxalic radical, to which
oxigene

oxigene only is wanted to convert it into oxalic acid.

Bergman is the first who discovered that sugar, treated by the nitrous acid, formed an acid different from all others, and which was called the acid of sugar or saccharine acid, for several years, until Scheele had shewn that this acid is absolutely of the same nature as the oxalic acid, obtained from the salt of sorrel by the process before described. He has ascertained this identity in the most convincing manner, by forming again the oxalic acidule of sparing solubility, or the salt of sorrel, by combining a small quantity of soda with the saccharine acid. Here, therefore, we have a vegetable acid which does not exist as an acid except in a few vegetable substances, but whose base is extremely abundant in these matters, and which appears to pass without alteration into the bodies of animals. We shall shew, in the following chapters, that this acid, like all the other vegetable acids, is probably a compound of hydrogen, carbone, and oxigene, and that it does not differ from them but in the particular proportions.

The oxalic base or radical appears to exist more abundantly in insipid matters than in sugar; though it was at first supposed that saccharine bodies afforded it in the greatest abundance. Bergman obtained from sugar no more than one third of its weight of oxalic acid,

acid, and Mr. Berthollett obtained from wool more than half the weight he made use of.

The pure oxalic acid is of no use, excepting in chemical laboratories, where it is more especially employed to determine the presence of lime. The oxalic acidule, or salt of sorrel, is employed to take out ink-spots from white stuffs, wood, ivory, &c. which it does by virtue of its attraction for iron; but the pure oxalic acid might be advantageously substituted instead thereof, on account of its greater solubility."

CHAPTER VII.

[This chapter is entirely new written ; the matter contained between the beginning of Section XII. page lxxxi and page lxxxvi line 2, of the Preliminary Discourse, being incorporated into it with alterations and amendments. The chapter is as follows.]

“ Concerning the Vegetable Acids formed by the Action of Fire, and by that of the Nitric Acid.

IT has long been known in chemistry, that many vegetable substances afford acid phlegms or liquors by distillation ; but sufficient attention had not been paid to these saline substances altered by fire. Since the discovery of so many acids, really differing from each other, whether by their intimate nature, or by a modification relative to the proportion of their principles, many of these salts have been observed to possess distinctive and particular properties. It has likewise been found, that some acids act upon vegetable matters in the same manner as heat, and that the nitric acid converts most of them into acids. In order to know these saline substances, whether new or modified, it will be necessary

necessary to examine them with care. We must first observe, that the vegetable acids, formed by the action of heat, must possess an analogy of nature or formation; it is on account of this analogy that we distinguish them by the generic names of empyreumatic acids; and to specify each of them, we prefix the word pyro to the expression, which indicates its origin; thus we say, the pyro-tartareous, pyro-mucilaginous and pyro-ligneous acids.

§ 1. *Concerning the Pyro-tartareous Acid.*

WE have already observed, that, in the distillation of the tartareous acidule, an acid phlegm is obtained, which is not the pure acid of that substance, but the salt altered in a peculiar manner. The hydrogenous gas and the carbonic acid gas, which are disengaged at the same time, sufficiently announce this alteration, because it is at the expence of the principles of the acid of tartar that they are formed. As it is from heat that this alteration of the tartar arises, and as there is an oil driven up together with the distilled acid, which modifies the colour of this last, we have called this acid pyro-tartareous, and its saline combinations pyro-tartrites, according to the rules of the methodical nomenclature.

The first chemists who conducted their researches with some accuracy, determined, that
by

by distillation they obtained one fourth of the weight of the tartar, consisting of an acid phlegm of a very penetrating smell, which was the pyro-tartareous acid. The rectification, or second distillation of this acid, which has been recommended by a great number of authors, exhibits a very great difficulty, according to the academicians of Dijon, namely, that the rapid elevation of the liquid always burst the vessels, in spite of every care they took to moderate the heat, and leave room for the vapours. They attribute this elevation to the gas produced by the decomposition of the acid, and compressed by the oil, against the pressure of which it prevails at last by its great dilatation. However, this rectification may be dispensed with; and the acid, separated from the oil by means of the funnel, is sufficiently pure to exhibit all its distinctive characters.

The pyro-tartareous acid has an empyreumatic smell and taste; it does not redden violets, but it does turnsole and blue paper; it disengages the carbonic acid from its bases, with a strong effervescence: with earths and alkalis it forms salts, which are very different from those constituted by the tartareous acid. These saline compounds have not yet been examined: it is only known that the pyro-tartrites of potash and of soda are soluble in cold water, and are crystallizable; that it decomposes the nitrate of silver, forming

forming a grey precipitate ; that it does not decompose the nitrate of mercury but slowly ; that it does not decompose calcareous muriate ; and that its neutral salts are decomposed by distillation with the vitriolic acid.

Chemists, before they arrived at the knowledge that hydrogen, carbone, and oxygen appear to be the true principles of all the vegetable acids, which differ from each other only in the proportions, had adopted opinions very remote from truth concerning the acid obtained by distillation from tartar. Vennel affirmed that it was the acid of nitre. Mr. Monnet, upon more positive experiments, imagined this acid to be the muriatic acid, disguised by oil and mucilage. But though Scheele found a small portion of muriatic acid in tartar, yet the cubic form of the neutral salt, produced by adding the pyro-tartareous acid to soda and the precipitation of the nitrate of mercury (two properties, on which Mr. Monnet established the identity of the pyro-tartareous acid with the muriatic acid), are not, at present, sufficient to chemists to ascertain this identity ; besides which, these experiments did not equally succeed in the hands of the chemists of Dijon. Messrs. Berthollett, Spielman, and Corvinus likewise did not succeed better. It is, on the contrary, very probable that the pyro-tartareous acid possesses no other principles than those of the tartareous acid itself ; from which it appears to

to differ only in the quantity of those principles: this modification is proved by the smell, the taste, the want of crystallization, by all the other properties of this empyreumatic acid, and, more especially, by the oil and the gaseous carbonic acid, which is disengaged from the tartareous acidule at the same time as the pyro-tartareous acid is formed.

Sufficient researches have not yet been made on this empyreumatic acid, to determine the order of its chemical attractions with earthy, alkaline, and metallic bases.

§ 2. *Concerning the Pyro-mucilaginous Acid.*

BY the name of the pyro-mucilaginous acid, we distinguish that which is obtained from insipid, saccharine, gummy, or farinaceous &c. mucilages, by distillation, and which Mr. de Morveau had at first named the syrupous acid. Chemists have long known that sugar affords by distillation an acid phlegm, which is even of considerable strength. Neuman, Cartheuser, Geoffroy and Bucquet made particular mention of this acid, but without ever examining its properties. Mr. Schrickel is, of all the chemists, the person who has attended most particularly to this principle of sugar.

By distilling sugar, Mr. Schrickel obtained, from 16 ounces, 6 drams of phlegm, passing in white vapours, and condensed in oily streams

streams of a penetrating smell of horse-radish or roasted bitter almonds, and of a yellow colour. He rectified it from clay; the acid passed clear, with a mild smell and a sourer taste. This acid, thus purified, did not crystallize; but when exposed to cold, the aqueous part froze, and the portion which remained liquid, was much more concentrated.

Mr. de Morveau has observed, in preparing the pyro-mucilaginous acid, that the bottom of the retort was corroded. He does not attribute this corrosion to the acid, which does not exhibit that property when rectified, or when left a long time in the glass, but to the action and adherence of the carbure of iron or plumbago, which exists in the residual charcoal left by the sugar, and which he had heated very strongly. This acid cannot be concentrated by the volatilization of the water which is united to it, because it is itself as volatile as that fluid. It is this acid which exists in melasses, and, according to Mr. de Morveau, renders them deliquescent, and prevents their crystallization.

The pyro-mucilaginous acid, when concentrated by heat, is very penetrating, and strongly reddens blue vegetable colours. It spots the skin of a red colour, as Cartheuser long since observed; and this spot does not disappear but with the epidermis. It rises totally by the fire, and leaves only a brown trace;

trace ; it is changed, for the most part, into gaseous carbonic acid and hydrogenous gas, by cautious distillation in well-closed vessels ; it then affords a coaly residue, more abundant than when it is heated in open vessels : part rises without alteration.

Combined with barytes, magnesia, lime, potash, soda, and ammoniac, it forms neutral salts, which we call pyro-mucites, whose properties have hitherto been little examined, but which differ from all the known salts. It disengages the carbonic acid from all these alkaline bases with a strong effervescence.

Though the property of dissolving gold was formerly attributed to the spirit of honey, it appears certain that the pyro-mucilaginous acid does not touch this metal, nor platina, nor silver, nor even mercury ; but it may, perhaps, dissolve their oxides or calces. This acid corrodes lead, and becomes opaque in consequence of the calx of this metal which is formed ; the pyro-mucite of lead has the form of long crystals : it likewise attacks copper, and becomes green ; it dissolves tin, and attacks iron, with which it forms a crystallizable salt.

Its chemical attractions have been determined by Mr. de Morveau in the following order : potash, soda, barytes, lime, magnesia, ammoniac, clay, metallic calces, water, alcohol.

This empyreumatic acid has not yet been applied to any use ; the spirit of honey, of

manna, &c. was formerly used in pharmacy, but this usage has long since been abandoned.

§ 3. *Concerning the Pyro-ligneous Acid.*

THE distillation of wood, more especially beech, birch, and box, affords a brown acid liquid of a peculiar smell, and considerable strength, which reddens blue vegetable colours, and causes an effervescence with mild alkalis. Boerhaave was acquainted with the product of box, guaiacum, juniper, and oak; but the chemists who have repeated the process of Boerhaave have not examined the nature and particular properties of this acid. Mr. Goettling is the first who published, in 1779, in Crell's Journal, a memoir on the Acid of Wood, and more especially its union with alcohol. This learned man made use of the bark of birch, which he distilled in an iron retort: the brown and oily acid which he obtained was left at repose for three months; he separated, by the filtre, the drops of oil which arose to the surface, and poured a solution of potash into the liquor. A lively effervescence was produced, the liquor assumed a blood red colour, and after saturation with the alkali, and evaporation, it afforded a black salt, which was melted in an iron ladle, and purified by a second solution and evaporation.

The pyro-ligneous acid may likewise be rectified

rectified by distillation, according to Mr. Goettling.

The pyro-lignite of potash formed by this rectified acid becomes very hot by the addition of vitriolic acid, and the pyro-ligneous acid is disengaged in a state of considerable purity. This chemist, to whom we are indebted for these experiments, has observed, that the pyro-ligneous acid, separated by means of the vitriolic acid, lost its empyreumatic smell, but acquired that of garlick.

The chemists of Dijon employed the wood of beech to obtain this acid, which they distilled, and afterwards rectified the liquid product; 55 ounces of this wood in dry chips afforded them 17 ounces of rectified acid, of an amber colour, without mixture of oil, and whose weight, compared with that of distilled water, was in proportion of 49 to 48: 23½ ounces of lime-water were required to saturate one ounce of this acid. When gently heated, it rises in vapour. A strong heat decomposes it as well as all the other vegetable acids. It cannot be obtained in the concrete form.

It combines with earthy and alkaline bases, and forms peculiar salts, which we call the pyro-lignites of clay, of barytes, of magnesia, of lime, of vegetable alkali, of soda, and of volatile alkali. These salts have not been yet examined with sufficient attention to enable us to give a sketch of their history. Mr. Eloy Boursier de Clervaux has communi-

cated, in the Dijon course of chemistry, experiments proper to determine some of the elective attractions of the pyro-ligneous acid. Calcareous earths and barytes adhere more strongly to it than the alkalis; lime more strongly than barytes; and magnesia more strongly than the volatile alkali: so that the order of these attractions alone might serve to distinguish it from most of the other vegetable acids. It acts on several metals, and dissolves most of their calces.

It seems as if all woods would afford the same acid by distillation, since box, birch, and beach have already afforded a similar one. We perceive, however, what a number of experiments remain to be made to complete our knowledge of the properties and distinctive characters of this acid.

§ 4. *Concerning the Vegetable Acids formed by the Nitric Acid.*

BERGMAN has shewn that the nitric acid converted sugar into an acid, which was at first thought to be different from all others, and was distinguished by the name of the saccharine acid. Scheele has shewn, that this acid is absolutely of the same nature as that which is partly neutralized by potash, in the salt of sorrel: this identical acid is, therefore, at present, the oxalic acid. Several modern chemists, and more especially Mr. Berthollett, have

have proved that the greatest part of vegetable and animal matters afford this acid by means of that of nitre. It is certain, therefore, that the base, or oxalic radical, exists in a great number of substances, and generally in all those which have been formed by the action of vegetable or animal life. The nitric acid acts in an equal and uniform manner upon all these substances; it always yields to them a greater or less quantity of its oxigene, and passes to the state of yellow nitrous acid, nitrous gas, and even azotic gas, according to the proportion of oxigene which is disengaged. Accordingly as the base or oxalic radical is more or less abundant in the different organic matters which contain it, a greater or less quantity of this acid is formed by the nitric acid. At the same time that the acid of nitre is decomposed by organic substances, a certain quantity of carbonic acid gas is disengaged, together with the nitrous or azotic gas; which proves that the organic matter has lost a portion of its carbone, and that the oxalic acid which arises contains less of this principle than the substance which afforded it. Since several vegetable acids, and in particular that of tartar, pass to the state of oxalic acid by the action of the nitrous acid; and since carbonic acid is disengaged during the time this conversion is effected, we see very well, that these vegetable acids have the same radical, and differ only in the proportion of oxigene.

It has been announced in the *Nouvelles de la République des Lettres*, for the year 1785, numbers 42 and 44, that Mr. Kosegarten obtained from camphor, by distilling nitric acid, eight successive times from it, a concrete acid, crystallized in parallelopipedons, of a bitter taste, and which reddened the tincture of violets and of turnsole. This salt, according to the chemist we have quoted, differs from the oxalic acid in not taking lime from the muriatic acid: it forms, with potash, a salt in regular hexagons; with soda, a salt in irregular crystals; with volatile alkali, prismatic or needle-formed crystals; and with magnesia, a soluble pulverulent salt. It dissolves copper, iron, bismuth, zinc, arsenic, and cobalt: but these first facts, which have not yet been confirmed, are not sufficient to enable us to treat the properties of this acid in detail; which, perhaps, is only a modification of some of those we have described. If new researches concerning this acid should discover peculiar properties different from those of all others, its nature will be examined and characters described under the name of the camphoric acid, and of camphorates for the neutral salts.

Mr. Brugnatelli discovered, in 1787, that cork, upon which he had distilled four times its weight of nitric acid, left a yellowish thick acid mass, soluble in water, of a sour and slightly bitter taste. This acid is not crystallizable:

stallizable: by a strong evaporation, it is converted into a viscid mass resembling wax, and which, like that substance, may be softened and moulded between the fingers. It is soluble in alcohol, is converted into coal without taking fire upon ignited coals: with the earths and alkalis it forms deliquescent salts, several of which crystallize: lastly, it has as strong an attraction for lime as the oxalic acid, and forms with it a salt, insoluble in water, but dissoluble in the muriatic acid.

Without making any decision on the peculiar nature of this acid, Mr. Brugnatelli seems, nevertheless, to think that it differs from the oxalic acid. New experiments must decide whether this acid be really different, and it deserves to be particularly examined, as well as that which Messrs. Proust and Angulo have discovered near Madrid, on the surface of chick-peas, in the vesicles placed at the extremity of the hairy fibres of this leguminous plant.

Such is the history of all the known vegetable acids: it remains, therefore, only to treat of those which are formed by fermentation; but the best, and indeed the only known of these acids, is the product of an alteration which takes place in liquors already fermented. We shall place its history immediately after that of the spirituous fermentation, and its product.

CHAPTER VIII. of the new Edition.

Concerning the Saccharine Matter, Gums, and Mucilages.

THIS chapter is taken, with alterations and amendments, from chapters V. and VI. of the former edition. It commences as in page 31, and proceeds without alteration to page 33, line 13 from the bottom, where the following sentence is inserted: "This acid can be nothing else but that which is formed by heat, or the pyro-mucilaginous acid we have spoken of in the preceding chapter. As the liquor is quickly evaporated," &c. as in line 12.

P. 33, l. 3 (from the bottom).

Read, "By distillation it affords water, pyro-mucilaginous acid, and some drops of empyreumatic oil; at the same time that a great quantity of carbonic acid gas, and hydrogenous gas, holding charcoal in solution, are disengaged. The residue," &c.

P. 34, l. 4.

Read, "acid vapour."

P. 34,

P. 34, l. 9.

Read, "Syrup, diluted with water, is capable of fermentation, of becoming a vinous liquor, and of affording alcohol by distillation."

—— l. 21.

After the word "summits," add, "which are the concrete oxalic acid." The rest of the paragraph is left out, and the matter contained in the following pages, to the end of the paragraph, at the words "saccharine acid," is inserted in the VIth. chapter of the new edition, as already noticed in page 199 of this Supplement.

The present chapter proceeds, as in line 7 from the bottom of page 41.

"Sugar is very extensively useful," &c.

P. 43, l. 7.

Read, "It affords the concrete oxalic acid."

The subject goes forward as in chapter VI. without any subdivision.

P. 45, l. 11 (from the bottom).

Read, "liquid pyro-mucilaginous acid."

ALTERATIONS AND ADDITIONS IN CHAPTER VII.

(Numbered IX. in the new edition.)

P. 47.

Entitled, "*Of fixed Oils, or such as are obtained by Expression.*"

THROUGHOUT this chapter the Author has substituted the expression "fixed oils," instead of "fat oils."

P. 49, l. 16.

Read, "It is at present proved that this thickening is due to the absorption of atmospheric oxigene, because all bodies which contain this principle, and yield it to fixed oils, such as several acids, and especially the oxygenated muriatic acid, metallic calces, thicken fixed oils, and bring them nearer to the state of wax."

— l. 11 (from the bottom).

Read, "by distilling these the pure sebacic acid, which we shall speak of in treating of the animal kingdom, and an oil," &c.

P. 53,

P. 53, l. 4 (from the bottom).

Read, "The sulphur is volatilized, dissolved in the disengaged hydrogenous gas of the oil, and cannot be found again in the solid state."

ALTERATIONS AND ADDITIONS IN CHAPTER VIII.

(Numbered X. in the new edition.)

P. 58.

IN the title of this chapter and elsewhere, the Author has substituted the expression "volatile oil," instead of "essential oil."

P. 60, last line.

After the word "alkalis," insert, "with which they form imperfect soaps, which we call favonules."

P. 61, l. 11.

Read, "The sulphur is so greatly divided that it can no longer be extracted, and is separated by heat, in the form of sulphurated hydrogenous gas, or hepatic air."

ADDITION IN CHAPTER IX.

(Numbered XI. in the new edition.)

P. 64, l. 13 (from the bottom).

AFTER the full stop insert, "Mr. Kosegarten has discovered, as we have shewn in the VIIth. chapter, that the nitric acid, distilled eight successive times from camphire, changes it into a crystallizable acid, which he believes to be of a peculiar nature."

ALTERATIONS AND ADDITIONS IN
CHAPTER X.

(Numbered XII. in the new edition.)

P. 66.

THE Author uses the word "aroma" instead of "spiritus rector;" and he announces this change, by inserting the following, in line 13 of the present page: "Instead of spiritus rector, we substitute the word aroma, from which the word aromatic, already so well known in our language, is derived."

P. 68, l. 2 (from the bottom).

Add, "Mr. Berthollett has found, that the oxygenated muriatic acid often destroys the smell of vegetables, and consequently alters their aroma."

P. 70, l. 11.

Instead of the three following lines, read, "and that it is this combustible substance, reduced to the state of elastic fluid by its combination with hydrogen, which constitutes the aroma of cruciferous plants."

ALTERATIONS AND ADDITION IN
CHAPTER XI.

(Numbered XIII. in the new edition.)

P. 74, l. 4 (from the bottom).

INSERT, "We have explained the properties of this acid in one of the preceding chapters."

P. 75, l. 6.

The paragraph beginning with the words "Bergman and Scheele" is omitted.

P. 76, l. 1.

After the word "examined," the remainder of the paragraph runs thus: "It is thought that it does not essentially differ from the acid of benzoïn."

CHAPTER XII.

(Numbered XIV. in the new edition.)

IN this chapter there are no alterations.

ADDI-

ADDITION IN CHAPTER XIII.

(Numbered XV. in the new edition.)

P. 87, l. 5 (from the bottom).

INSERT, "I have examined the juice of caout-chouc, which was sent to me from Madagascar. This juice was as white as milk, of an insupportable fœtid smell. It contained a white concrete spongy matter, which occupied the middle of the bottle, whose form it had assumed, and which was elastic. By heating the liquor, a white pellicle was soon formed at the surface, consisting of true elastic resin. Alcohol, mixed with the juice, separated this resin in flocks.

The dry caout-chouc, such as it is brought to Europe, exposed to the heat of a fire, softens, swells, emits a fœtid odour, and burns at the same time that it shrinks."

CHAPTER XIV.

(Numbered XVI. in the new edition.)

THIS chapter is not altered.

CHAPTER XV.

(Numbered XVII. in the new edition.)

THIS chapter is not altered.

CHAPTER XVI.

(Numbered XVIII. in the new edition.)

THIS chapter is not altered.

ALTER-

ALTERATION IN CHAPTER XVII.

(Numbered XIX. in the new edition.)

P. 119, l. 13.

THE two following sentences, beginning with the words "this fact," and ending with the word "accuracy," are left out.

CHAPTER XVIII.

(Numbered XX. in the new edition.)

THIS chapter is not altered.

CHAPTER XIX.

(Numbered XXI. in the new edition.)

THIS likewise is not essentially altered.

ALTERATION IN CHAPTER XX.

(Numbered XXII. in the new edition.)

P. 147, l. 4.

AFTER “colouring matter,” the paragraph ends thus: “and of an aroma, which is lost or modified by the action of fire. We are acquainted with the nature and properties of most of these substances; ardent spirit, therefore, only remains to be treated of.”

ALTERATIONS AND ADDITIONS IN
CHAPTER XXI.

(Numbered XXIII. in the new edition).

P. 160, l. 13 (from the bottom.)

INSTEAD of the concluding line of this paragraph, read, “and that part of the hydrogen, or principle of the spirit, forms water with this oxygen, while the alcohol, deprived of this portion of this oxygen, forms ether. But the whole which passes in this operation is not known.”

P. 162, l. 7.

The remainder of this paragraph runs as follows: “Mixed with the muriatic solution of gold, it retains a part of that metal, and in this case appears to act like the volatile oils, which likewise retain a portion of the calx of gold. Like alcohol, it dissolves volatile oils and resins, and accordingly physicians often use ethereal tinctures.”

P. 176, l. 2.

Read, “distilled spirituous waters.”

CHAPTER XXII.

Concerning Tartar.

THIS chapter is inserted in chapter VI. of the new edition. See page 185 of this Supplement, where the variations are noted.

ALTERATIONS AND ADDITIONS IN
CHAPTER XXIII.

(Numbered XXIV. in the new edition.)

P. 200, l. 1.

READ, "The presence of this salt influences the developement of the properties of vinegar."

P. 211, l. 6 (from the bottom).

Insert, "or rather the same which the sulphuric acid has to the sulphureous acid, or that which the nitric acid has to the nitrous acid."

P. 212, l. 9 (from the bottom).

Insert, "Mr. de Laffone has shewn, that the ammoniacal salt formed by radical vinegar, or the acetic acid, is very different from that formed by the common acetous acid, and called spirit of Mindererus: Although we do not possess a sufficient knowledge of the properties of all the acetates, yet their form, taste, solubility, &c. sufficiently shew that they really differ from the acetites. The Marquis of Courtanvaux," &c. as in the line above referred to.

P. 213, l. 2.

In this place is inserted the paragraph, beginning with the words "Radical vinegar," upon page 214, and the two following paragraphs on page 215, as far as the word "combustion" at line 19; after which the following paragraph is inserted:

"A great number of researches remain to be made by chemists concerning the acetic acid: the properties we have treated of are sufficient to shew, 1. That it remarkably differs from the acetous acid, or common vinegar. 2. That this difference depends on the oxigene, which is more abundant in the acetic than in the acetous acid; which excess has been taken by the latter from the calx of copper. We shall now proceed to examine some other properties of common vinegar.

The acid of vinegar," &c. and proceed as in line 3, page 213.

P. 214 and 215.

It has already been remarked, that the three paragraphs, from the words "Radical vinegar" to the word "combustion," are transposed to page 213; the subject, therefore, is continued by proceeding to line 20 on page 215. "Vinegar is much used," &c.

CHAPTER XXIV.

(Numbered XXV. in the new edition.)

THIS chapter is not altered.

PART IV.

P. 222.

THE Author has transferred the first eight chapters of this part to the beginning of his fifth volume, without any material alteration, except the following.

P. 239, after l. 11.

Insert, "Since the work of Mr. Daubenton, the Count de la Cépède has published a very extensive and accurate work upon oviparous quadrupeds, in which he has exhibited a particular method. This arrangement will be found in the fifth table, extracted from the work of Mr. de la Cépède." The table is inserted at the end of this Supplement, No. 1.

P. 255, at the bottom,

The Author takes notice that several celebrated naturalists have laboured on the subject of insects since Geoffroy; and, in particular, that he has not thought proper to adopt the method of Mr. Fabricius, because more complicated and embarrassing than that which he has used.

This fourth part, therefore, begins with

CHAPTER IX.

P. 279.

(Numbered I. in the new edition.)

THE Author has annexed a note, informing the reader of the transposition of the first eight chapters. No essential alteration is made in this chapter.

ADDITION IN CHAPTER X.

(Numbered II. in the new edition.)

P. 299, l. 2 (from the bottom).

ADD, " It seems to be in the fibrous substance that the particular acid exists, which the blood affords by distillation, and which Mr. Chauffier obtained by the action of alcohol. For this reason I have proposed to call it the cruoric acid, if it should hereafter be found to be a peculiar acid.

ALTER-

ALTERATION AND ADDITION IN
CHAPTER XI.

(Numbered III. in the new edition.)

P. 301, l. 7.

ADD, "It has always been supposed that the milk is separated immediately by the mammary glands from the blood that passes through the numerous arteries with which they abound; but the principles found in milk have not yet been shewn to exist in the blood. Modern anatomy has taught us that the breasts are provided with a great number of lymphatic and absorbent vessels, placed in a fatty membrane; the fluid they contain is probably one of the principal materials of milk."

P. 313, l. 5.

Instead of the paragraph as here given, the Author has said simply, "From all these facts it appears, that cheese is a substance resembling the albumen of the blood."

ALTERATIONS AND ADDITIONS IN
CHAPTER XII.

(Numbered IV. in the new edition.)

P. 322, l. 14.

READ, "It decomposes the tartrate of potash by precipitating cream of tartar, or the acidule of tartar; and it likewise decomposes the acetous alkaline salts. When strongly heated," &c. as in line 17.

P. 324, l. 7.

Read, "It is a kind of fixed oil, rendered concrete by a notable quantity of acid, and by oxigene, or the base of vital air."

P. 327, l. 3.

Insert, "With regard to the salt, which M. Cadet mentions in the charcoal of bile, as being analogous to sugar of milk; it is very clear that this substance could not have resisted the strong heat requisite to reduce the bile to the state of coal."

—— l. 16.

Add, "He has likewise discovered that bile which is altered, and has become of a brown, dirty, turbid colour, emitting a foetid smell, becomes

becomes by this treatment of a fine green, and loses its smell, at the same time that some whitish concrete flocks are separated.

P. 329, l. 16.

Add, "But it is probable that this pretended saline matter is rather analogous to the foliated, brilliant, and crystallized substance which Mr. Poulletier found in the human biliary calculi, and of which we shall proceed to speak."

P. 330, l. 17.

Add, "Some persons attribute particular virtues to the gall of fishes; but experience has afforded no proof of this assertion, which must be classed among the numerous prejudices which exist respecting the *materia medica*."

—l. 4 (from the bottom).

Insert, "I distinguish three varieties; the first are brown, blackish, irregular, tuberculated, and as it were of a crumbly texture: the second are harder, brown, yellowish, or greenish; they exhibit concentric layers, and are often covered with a dry, even, and greyish crust. Their form is usually angular and polyhedral. The third variety includes white, egg-shaped concretions, more or less irregular, with a whitish and frequently uneven covering, formed of sparry strata, or crystalline transparent laminæ, and often radiated from the centre to the circumference.

The biliary calculi of the second variety have been examined by," &c. as in line 2.

P. 331, l. 12.

Insert, " This very singular fact likewise requires confirmation, for M. Vauquelin and myself have observed a small quantity of lamellated matter in the calculi of oxen."

—— l. 18.

Read, " biliary calculi of the second variety above described."

—— l. 6 (from the bottom).

Insert, " I have collected two others entirely similar, which were given me by my associates Messrs. Preux and Halle."

—— last line.

The following paragraph is omitted, ending on p. 332, l. 12.

P. 332, at the bottom.

Add, " Nevertheless, it must not be imagined that these remedies, however active and volatile they may be, can arrive in sufficient quantity into the bladder to dissolve the biliary calculi with the same efficacy as they do in our experiments. I think, that the cessation of spasm, and the dilatation of the gall-duct which follows, is the true cause of the good effects of the ethereal mixtures proposed by Mr. Durande, whom I advise to suppress the oil of turpentine; more especially as it appears

pears to be proved, that, though it be in other respects very heating, it has no other advantage than that of diminishing the volatility of the ether ; and that it is already proved from observation, that white of egg, and doubtless many other substances, might be employed for the same purpose, and without producing the same inconveniences."

ALTERATIONS AND ADDITIONS IN
CHAPTER XIV.

(Numbered XVI. in the new edition.)

P. 336, l. 5 (from the bottom).

INSERT, "Messrs. Macquart and Vauquelin I have found evident acid properties in the gastric juice of oxen, calves, and sheep; but it follows, from their exact experiments, that this character is derived from the disengaged phosphoric acid: they have likewise ascertained, that these juices alter and putrefy readily enough. It appears that the gastric juice of carnivorous animals possesses the antiseptic property most eminently."

P. 337, l. 6.

After the word "substances," insert, "and which is even said to be capable of attacking siliceous stones."

— l. 2 (from the bottom).

Instead of the sentence "Time and experience," &c. insert, "But the experiments of Messrs. Macquart and Vauquelin, above spoken of, and which were made in my laboratory, prove that this antiseptic quality does not belong to the gastric juice of ruminating animals."

CHAPTER XV.

(Numbered VII. in the new edition.)

THIS chapter is not altered.

ALTERATIONS AND ADDITIONS IN
CHAPTER XVI.

(Numbered VIII. in the new edition.)

P. 344, l. 2.

ADD, " or by the absorbent vessels."

—— l. 12.

After the words " phosphoric salt," add,
" and the acid of the stone of the bladder."

P. 345, line the last.

The Author has annexed a note, observing that Coldevillars had mentioned, in his Course of Surgery, that urine constantly reddens the tincture of turnsole.

P. 346, l. 12.

Instead of " holds," read, " appears to hold."

—— l. 5 (from the bottom).

The last five lines of this page are omitted.

P. 351, l. 5.

Add, " until the effervescence ceases, and the saturation of the acid is complete."

CHAPTER XVII.

(Numbered IX. in the new edition.)

THIS chapter is not altered.

ALTERATIONS AND ADDITIONS IN
CHAPTER XVIII.

(Numbered X. in the new edition.)

P. 377, l. 15.

AFTER the word “dark,” insert, “This rapid combustion takes place with a very strong heat, and dazzling light, in a receiver full of vital air.”

P. 381, l. 16.

Insert, “Mr. Pelletier has observed that copper combines very well with phosphorus, and that the result of this combination is a kind of grey, brilliant, granulated, very hard, and infusible ore. We give to these compounds, into which phosphorus enters without alteration, the name of phosphures of copper, zinc, arsenic, &c.”

ALTER-

ALTERATIONS AND ADDITIONS IN
CHAPTER XIX.

(Numbered XI. in the new edition.)

P. 383.

THE title of the chapter is,

“Concerning the Phosphoric Acid and the Phosphoreous Acid.”

In this chapter, the Author makes a distinction between the phosphoric acid and the phosphoreous acid, or phosphoric acid which holds phosphorus in solution; and he has accordingly divided the chapter into two sections, as expressed in the title. After the description of the general processes for acidifying phosphorus, in which he remarks that the three first afford the phosphoric, and the latter the phosphoreous acid,

P. 385, l. 4.

The Author has erased the last four lines of the paragraph, and begins to treat of the phosphoric acid in the ensuing paragraph, which he has altered as follows:

R 2

“Concern-

“ Concerning the Phosphoric Acid.

THE pure phosphoric acid, obtained without addition of water and in vital air, has the form of white, snowy, light, deliquescent flocks, of a very strong acid taste. By exposure to the air, it strongly attracts humidity. When placed in contact with a small quantity of water, it melts or is dissolved easily, and affords a white fluid without smell, of an oily consistence, very ponderous, of a strongly acid taste, and rapidly converting blue vegetable colours into red. If it be exposed to the action of heat in a retort, pure phlegm is obtained; the acid becomes concentrated, and acquires a greater specific gravity than even the sulphuric acid, gradually becomes more consistent, loses its transparency, and resembles a soft extract: lastly, when urged by a violent heat, it melts into a hard, very electric, and insoluble transparent glass, which presents no character of acidity. It seems that this vitreous and solid state of phosphorus depends on a more intimate combination between the acidifiable base and oxigene and the separation of part of the latter. This idea respecting the more intimate adherence of the base of air,” &c. as in line 2, p. 386.

P. 387, l. 13 (from the bottom).

Erase the words “and even by the caustic fixed alkali.”

P. 388,

P. 388, l. 12 (from the bottom).

Instead of the remaining lines of the paragraph, insert, " does not crystallize but with difficulty, and is often reduced by evaporation into a gummy deliquescent matter, tenacious and adhesive like turpentine. I have observed in this thick matter, needles disposed in radii, which denoted a commencement of crystallization. But if a little more soda be added to this salt, than is necessary to saturate its acid; this excess of base, which it is capable of taking up, immediately changes its properties; its taste becomes urinous; it converts the syrup of violets to a green; it crystallizes in large parallelograms, and effloresces in the air: in a word, it assumes all the properties of the fusible salt with base of natrum, which we call the super-saturated phosphate of soda. This salt does not afford phosphorus with charcoal: however, the phosphoric salts of ponderous earth, lime, vegetable alkali and soda, likewise do not afford it; and it seems necessary that the phosphoric acid should be in a disengaged state before it can be decomposed by charcoal."

P. 389, l. 4.

Instead of the last four lines of this paragraph, read, " I have observed that when the combination is accurately neutral, it is very difficult to obtain it crystallized, and that it almost totally evaporates by a gentle heat;

R 3

but

but an excess of volatile alkali favours the crystallization of this salt: a small quantity of the phosphate of soda produces the same effect, and in this state it is that we obtain it from urine. Ponderous earth, lime, and alkalis decompose the ammoniacal phosphate: fire readily disengages its volatile alkali, and it is on this account that it affords phosphorus with charcoal."

P. 389, l. 3 (from the bottom).

Insert, " in which it occasions precipitates.

The nitric and acetous solutions of lead are equally precipitated by the phosphoric acid, and by the soluble phosphoric salts: the precipitate afforded by the decomposition of these last, or the phosphate of lead, affords phosphorus by distillation with charcoal."

P. 391, l. 3.

Insert, " Mr. Hassenfratz has extracted it from a great number of plants which grow in the marshes, and from the earthy part of turf."

— l. 7.

Add, " Lastly, Mr. Proust has found it combined with lime, in a sparry stone, from Spain."

— l. 11.

At the end of the chapter the following is added :

" Con-

“ Concerning the Phosphoreous Acid.

WE have observed, that when phosphorus burns slowly, and does not become entirely saturated with oxigene, it forms an acid different from the former, and which has the same relation to it as the sulphureous acid has to the sulphuric acid, the nitrous acid to the nitric acid, and the acetous acid to the acetic acid: this diversity of the proportion of oxigene in this acid, causes a very great difference in its properties, as is observed in the other three acids. The phosphoreous acid may likewise be considered as the phosphoric acid, holding a small quantity of phosphorus in solution. This acid assumes a foetid and disagreeable smell when it is rubbed, and especially when it is heated; part is volatilized in the form of a white vapour, which is very acute and penetrating: it is, therefore, much more volatile than the phosphoric acid; but this phosphoreous acid never rises wholly in vapour like the sulphureous acid, and always contains a greater or less quantity of phosphoric acid, for which reason it leaves a vitreous residue, or melted phosphoric acid, when treated with a strong heat. It may be prepared by decomposing the phosphoric acid, and there is always a certain quantity disengaged in the operation of making phosphorus. All the distinctive properties of the phosphoreous acid have not been examined in detail;

but those which have been observed are sufficient to indicate the difference between this acid and the phosphoric acid. Mr. Sage, in the Memoirs of the Academy for the year 1777, has shewn some of the characteristic properties of the phosphoreous acid. According to this chemist, the salt which results from the acid obtained by the deliquium of phosphorus, when united to potash, or the phosphite of potash, is not deliquescent; the phosphite of soda is likewise crystallizable, and not deliquescent; the ammoniacal phosphite, on the contrary, attracts the humidity of the air."

CHAPTER XX.

(Numbered XII. in the new edition.)

THIS chapter is not altered.

CHAPTER XXI.

(Numbered XIII. in the new edition.)

P. 405, at the bottom of the text.

THE Author has observed, that, in the making of phosphorus from the acid of bones, the evaporation should be carried on till it has the consistence of an extract, and the distillation must then be made with charcoal.

The rest of the chapter is as it stood in the former edition.

ALTERATIONS AND ADDITIONS IN CHAPTER XXII.

(Numbered XIV. in the new edition.)

P. 411, l. 10 (from the bottom).

READ, "A prodigious quantity of elastic fluid is disengaged, consisting of a mixture of carbonic acid gas, azotic gas, and hydrogenous gas, holding charcoal and even volatile oil in solution. This last is gradually precipitated in cooling, and adheres to the sides of the glass jars in which the elastic fluid is preserved."

P. 413, l. 7 (from the bottom).

Add, "There are several manufactures of these candles in England, and there has been one established at Paris for some years past."

P. 414, l. 8 (from the bottom).

Add, "It really differs from wax: it appears to be, with respect to the former of these oils, the same which resin is to the latter."

P. 415, l. 8.

Add, "It appears to me that this substance is very abundant in the animal kingdom, and
that

that it is an oil which particularly belongs to this kingdom."

In this place the Author has inserted the matter of chapter xxvii. page 434, of the third volume, concerning ambergris.

After which he proceeds to treat of the eggs of birds, as in the page first mentioned.

ALTERATIONS AND ADDITIONS IN CHAPTER XXIII.

Page 418.

THE Author has continued the subject without making the division of a chapter in this place.

P. 418, l. 2 and 3 (from the bottom).

Erase the words “ zoophagous—whose humours are more attenuated than most quadrupeds.”

P. 419, l. 11 (from the bottom).

Insert, “ But these virtues may be doubted.”

P. 422, l. 12 (from the bottom).

Add, “ Its attractions have been disposed in the following manner by Messrs. Ardwisson, and Oerhne: ponderous earth, vegetable alkali, mineral alkali, lime, magnesia, volatile alkali, zinc, manganese, iron, lead, tin, cobalt, copper, nickel, bismuth, silver, clay.”

P. 427, l. 10.

Read, “ it affords the acid of fat, or sebacic acid.”

P. 428, l. 5.

Insert, “ In the separation by alcohol, this fluid carries the liquor through the filtre, and there
1 remains

remains on the paper a fat orange-colour oil, a gummy matter, and a small quantity of gluten. To obtain the bombic acid, or acid of silk-worms, in a state of purity, the alcohol must be distilled: this last comes over, and the acid remains alone in the retort."

P. 431, l. 9.

For "strong," read, "stoney."

CHAPTER XV. of the new Edition.

P. 243.

[This chapter is inserted after chapter xxiii of the former edition, and is new. Its title is as follows.]

*“ Result of the Analysis of Animal Substances;
Comparison of these Substances with Vegetable
Matters.*

IN the fourteen preceding chapters, we have exhibited the actual state of our present knowledge concerning the nature of animal substances. Those who have cultivated chemistry for the last twenty years, will easily perceive how much that science has gained in this respect, and the singular progress it has made in this department. Though a much greater number of discoveries, beyond what is at present known, remains to be made, to complete the history of animal matters, yet those which we at present possess are of much greater value than what we formerly possessed. The course necessary to be held in this great work is at least discovered, and we need be no longer apprehensive of consuming our time in false pursuits; it is

7

clearly

clearly seen how much the philosophy of animal substances and the science of medicine may expect from chemistry, when these two sciences are connected together. If this assertion required any additional proofs to what we have already given in detail in the foregoing chapters, the short resumption we shall exhibit in this place would be sufficient to answer their purpose.

Those substances which have been called the immediate principles of organic bodies, that is to say, the matters which are separated immediately and without alteration from organized substances, greatly resemble each other; whether they be extracted from animals or vegetables. In fact, we find in both, extracts, the saccharine principle, insipid mucilages, acid and alkaline salts, fixed and volatile oils, resins, glutinous matter, an aromatic principle, and colouring substances. But notwithstanding this analogy, which has long been perceived, there still remain among the immediate principles of the two kingdoms, very remarkable differences, the examination of which deserves all the attention of philosophers.

1. The extract and saccharine matters are very far from being as abundant in the animal as in the vegetable kingdom.

2. The animal mucilages are not entirely of the same nature; they are softer, not so easily dried, and are disposed to attract the humidity of the air; they take the form of a jelly in cooling; their

their taste is stronger, they become sour, and more especially they putrefy much more rapidly.

3. The fixed oils in the animal kingdom likewise differ from those of vegetables. They are found collected in greater masses and in particular cells; they are always more or less concrete; and in many instances they are even capable of becoming dry, and assuming the crystalline form.

4. Volatile oils and resins are in general rarer, and much less abundant, in animals than in vegetables. It seems as if Nature had been careful to remove from the sensible and irritable organs of animals, such acrid substances which would have continually stimulated the fibres; and that she has even confined them to the external parts, and the vicinity of the tunics in vegetables.

5. The albuminous matter, which is concrement by heat, though it exists in the juices of plants, is much less abundant in them than in animals; in all the parts of which it is found, and often in very considerable quantities.

6. The fibrous substance, though analogous to the gluten of flour, has, nevertheless, more tenacity and elasticity in animals: besides which, they contain it in so large a proportion that, even if there were no other difference between animals and vegetables, this alone would deserve to employ the whole attention and research of philosophers. All the muscles,

cles, or all the organs of motion, are composed of this; and as animals possess a mobility which is not seen in vegetables, the parts necessary to move them ought to differ essentially from that which constitutes the motionless bodies of plants.

7. But it is more especially in the nature of their saline matters, that animals differ from vegetables. Besides the salts and saline radicals analogous to those of the vegetable kingdom, which are found in animals, such as lime, soda, the muriatic, oxalic, malic, benzoic, sebatic, and phosphoric acids, there have been extracted from them the lactic, saccho-lactic, lithic, formic, and bombic acids, whose nature is not known, but which do not appear to exist in vegetables. We likewise find in animals, much more abundantly than in vegetables, the principles necessary for the formation of volatile alkali and the Prussian acid; and it is more particularly by this character that animal matter differs from vegetable. The principles necessary to the formation of ammoniac, or volatile alkali, and the Prussian acid, are even so abundant in animal substances, that these two compounds are very often found ready formed in them, more especially some time after the death of animals. I have found Prussian blue in putrid animal substances: I have even seen in a sick person, whose blood was greatly altered, this fluid assume the brightest blue colour by exposure to air. But

it must not be overlooked, that vegetables likewise contain the principles of Prussian blue; though much less abundantly than animal substances. With regard to volatile alkali, its readier and much more frequent formation in animal than in vegetable matters, shews that its principles are much more abundant; and indeed Mr. Berthollett has proved, that these matters afford a very great quantity of azotic gas, by means of the nitric acid. I have proved after him, that, when this gas is extracted, these substances no longer afford ammoniac, or volatile alkali; it is, therefore, to the presence of this principle that they are indebted for the property of affording, in these artificial or spontaneous analyses, a great quantity of this alkaline salt.

If we proceed to inquire what are the more simple first principles of which these immediate principles are compounded, we shall find, that the only component parts of animal matters are, like those of vegetables, hydrogen, carbone, azote, and oxigene. These substances, hitherto indecomposable, these kinds of elements, appear to constitute, by their combinations, oils, acids, mucilages, the fibrous matter, &c. These various immediate principles do not differ from each other, but in the number and respective proportion of the primitive substances which compose them. But as animal matters, though formed in general of the same principles as vegetable substances, do
never-

nevertheless possess properties really different ; the productive cause of these differences appears to exist only in the various proportion of these principles. Thus the quantity of azote, which is much more considerable in animal matters than in vegetable substances, already explains a great part of these differences : it shews why animal substances afford much ammoniac by the action of fire, why they putrefy so readily, why they are necessary to the production of the acid of nitre, &c. Nothing more is required to be done than to determine what kind of change it is that vegetable matters undergo, in passing into the bodies of animals ; for it is certain that vegetable matters alone afford nourishment to animals, and are converted into their proper substance. We shall here take notice, that several immediate principles of vegetables pass without alteration, and preserve their own proper nature in the bodies of animals, or at least are very little changed : such in particular are several salts, the fixed oils, &c. But the different kinds of mucilages, the gluten, and the colouring matters, manifestly change their nature ; the gummy matter becomes gelatinous ; the gluten passes to the state of fibrous matter ; the base of azotic gas is fixed, and combines in great quantities in these substances, and seems, by its mere fixation, to change vegetable into animal matter. It is to this change, and the formation of the various animal substances, that phy-

fiologists ought to direct their attention more particularly: in a word, it is the problem of animalization which remains to be resolved. Analysis has already afforded some useful data for this solution; but many more remain to be investigated: and it is chemistry alone which, by its accurate processes, can encourage us to hope for the union of a number sufficiently considerable to arrive at this result, so useful to the philosophy of animal bodies.

ALTERATION IN CHAPTER XXIV.

(Numbered XVI. in the new edition.)

P. 441, l. 3.

THE concluding paragraph is omitted, and the Author proceeds to add the following new matter :

“ Thus far we have only described the phenomena which take place when animal matters putrefy, and are decomposed in the air: but as the result of this decomposition in different mediums throws great light on the knowledge of the revolutions of the globe, let us consider for an instant what happens to these matters, plunged in the water, or buried in the earth.

The changes hitherto described, do not take place perfectly in the water. The bodies of animals plunged in this liquid first swell up; elastic fluids are disengaged; the water dissolves a great part of their principles, decomposes another part, and disperses the different principles of these bodies among the great masses that constitute rivers and streams; whence several nations expose dead bodies in rivers, and commit their destruction to the water.

Other phenomena take place when bodies

are buried beneath the ground. Observations, most of which are the consequence of accidental circumstances, have shewn that their destruction varies according to the nature of the ground. Sometimes we find bodies entirely destroyed after a short interval, and sometimes they are found well preserved even after a very long time. It is easy to conceive, that if the earth is very porous and very moveable, if the animal matter be buried at a small depth, the air, and especially the water, which have an easy access to it, will facilitate its decomposition; but that in opposite circumstances it must be much slower. For example, dry earth absorbs the water of bodies, dries them, and converts them into mummy: such is the effect of a sandy soil, in which the bodies receive the impression of a burning sun, and acquire a degree of hardness which defends them from destruction for ages. On the contrary, argillaceous earth retains water, and permits the destruction of bodies. In the cases in which it takes place more or less slowly, the fluids and the solids finish, by being reduced almost entirely into azotic gas, carbonic acid gas, hydrogenous gas, and alkaline gas. All these elastic fluids being filtered through the earth, are stopped and partly fixed, and render the ground black, greasy, and fetid. They saturate it, as it were, with these products of putrefaction, until the dissolving power of water and air, the vaporization effected

fectcd by heat, and the absorption by vegetables, deprive the ground of the fluids with which it is impregnated. Thus it is that nature, by slow decompositions, reduces the bodies of animals deprived of life, to more simple substances destined to enter into new combinations.

This decomposition, considered on every part of the globe at once, in the earth, in the water, or in the air, produces great changes, which the philosopher ought to appreciate. By observing the vast extent of the seas, and the immense quantity of animals which inhabit them, we perceive those animals perish in enormous masses, and suffer a decomposition, which produces phenomena hitherto not sufficiently examined. What become of the immense remains of animal matters? To what successive revolutions are these ruins of living beings exposed?—It is known that the waters of the sea contain the marine and vitriolic salts of soda, of lime, and of magnesia. It cannot be doubted, but the muriatic acid, magnesia, lime, and soda, are continually formed in this vast laboratory. Perhaps the formation of many of these substances may take place during the life of these marine animals; but some others are certainly due only to the decomposition of the same substances after death. It cannot be denied, that the strata of calcareous matters, which constitute as it were the bark or external covering of the

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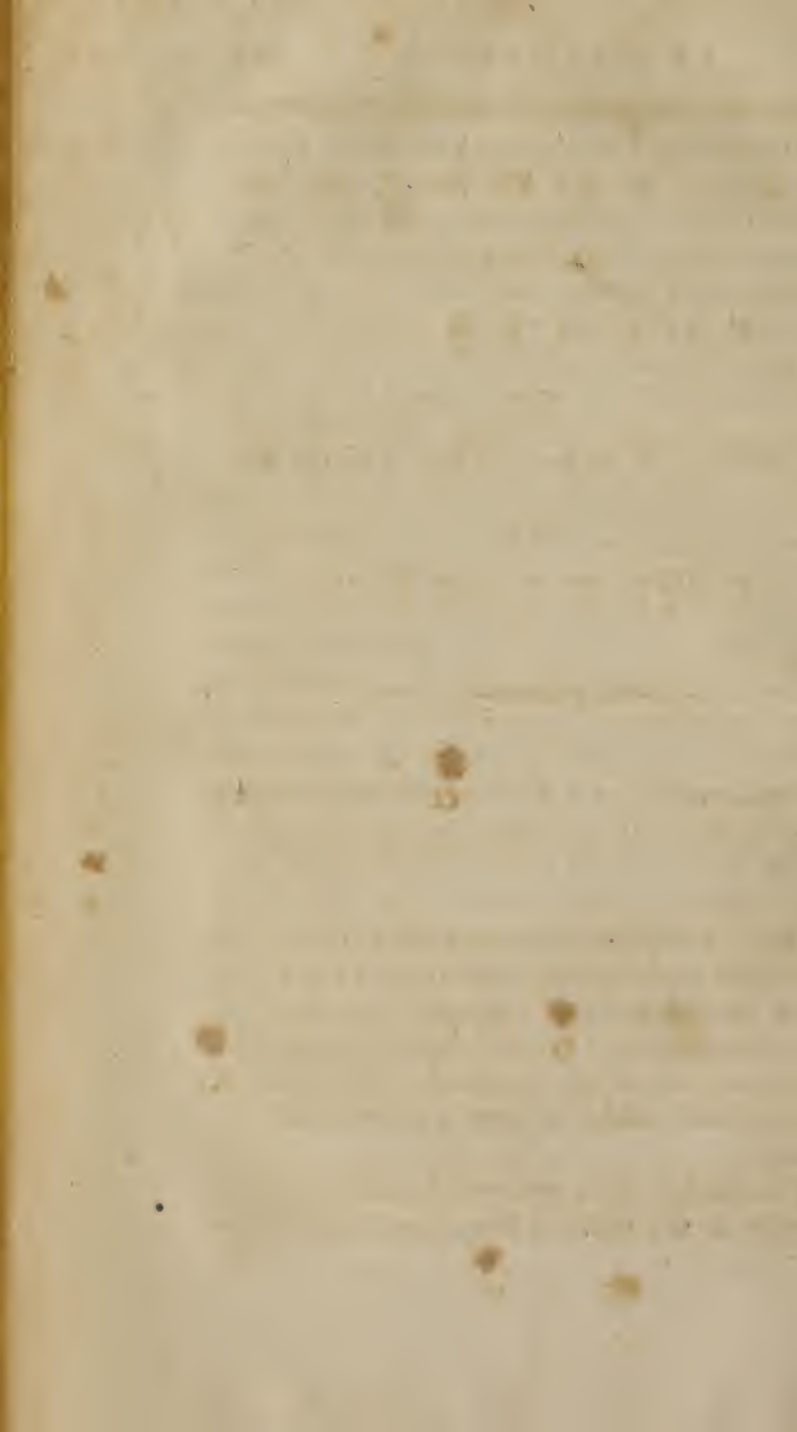
globe,

globe, in a great part of its extent, are owing to the remains of the skeletons of sea animals, more or less broken down by the waters; that these beds have been deposited at the bottom of the sea; that such is likewise the origin of bitumen, and more especially pit-coal, which is deposited in very thin and extended strata, which likewise occupy a part of the globe. There is therefore, in the sea, a never-ceasing cause of the decomposition of water: numberless agents continually separate its principles, and are themselves changed. Immense masses of chalk, deposited on its bottom, absorb and fix the water, or convert into a solid substance, part of the liquid which fills its vast basons.

From these considerations respecting the decomposition of animal substances in the earth, in the air, and in the water, united to all the data afforded by chemistry, it follows, that the external strata of the globe are no longer what they were at the moment of its formation; that it increases in solidity and extent by the successive and uninterrupted augmentation of these depositions; that the soil we inhabit is modern and factitious; that it does not belong to minerals; that this superficial soil is owing to the slow decomposition of animals and vegetables; that water is continually diminished in quantity, and changes its form; that one part being decomposed, furnishes one of the bases of the bodies of vegetables

getables and animals ; that another part is rendered solid in the calcareous strata added to the globe ; that the atmosphere must have been modified by all these successive changes ; that vegetables continually influence the atmospheric air ; and that the solar light is greatly concerned in all these mutual decompositions. Though it seems impossible to determine the times which have successively beheld the decomposition of water, vegetation, fermentations, putrefaction, the formation of saline substances, bitumens, calcareous matters, and the modifications of the atmosphere ; yet philosophy and chemistry, enriched by modern discoveries, shew us at least that these phenomena have taken place at different epochas ; that they continue to modify the actual state of the planet we inhabit ; and that if matter be one and the same thing, with respect to its mass and intimate nature, as great philosophers have thought, yet its form being continually varied by the combinations it experiences, must gradually produce great revolutions, of which modern chemistry alone can appreciate the cause, and of which perhaps it may some day foretel the final effects.

Here ends the fourth Volume.



S U P P L E M E N T

TO THE

E L E M E N T S

OF

N A T U R A L H I S T O R Y

A N D

C H E M I S T R Y.

ALTERATIONS AND ADDITIONS CONTAINED IN VOL. V. OF THE NEW EDITION.

THIS volume commences with the natural history of animals, contained in the substance of the eight first chapters of Part IV. beginning page 222 of the fourth volume. The few alterations which the Author has made in this Part are noted at page 232 of this Supplement.

The Author then proceeds to insert the supplement to the mineral kingdom, which contains

tains the method of analysing mineral waters. This is transferred from page 443, of vol. III. with the following alterations.

P. 471, l. 1.

Read, "If it occasion a precipitate, the mineral water contains aluminous or magnesian salts, or martial vitriol, which is constantly known by the colour of the precipitate: most commonly this precipitate is formed by chalk, which was dissolved in water by means of the carbonic acid. The ammoniac, or volatile alkali, absorbs this acid, and the chalk is deposited.

P. 474, l. 15.

Read, "This artificial hepatic water, which differs from natural sulphureous waters in being more loaded, and consequently more speedily decomposed, affords a precipitate," &c. as in line 20.

—— last line of the page.

Instead of, "but it did not produce," &c. read, "a very small quantity must be used, otherwise the excess burns, and reduces the sulphur to the state of sulphuric acid, as I have observed in the water of Enghien. The sulphureous acid precipitates the sulphur with great facility from waters which contain it."

P. 475, l. 7.

Erase the words "prepared with bullock's blood."

P. 476.

P. 476.

The lime water mentioned by the Author in this and the following page, is admitted by him to contain a small portion of Prussian blue.

P. 478, l. 12 (from the bottom).

Read, "We have already observed, that the astringent principle is a peculiar acid, since it unites with alkalis," &c. and proceed as in the last line of the page.

P. 480, l. 5 (from the bottom).

Erase the sentence beginning with the words "Lime and magnesia," and ending at the word "appearance."

The next article in the present volume is entitled,

A Discourse concerning the Principles of modern Chemistry, considered in a collective View.

This Discourse consists for the most part of the matter of the Preliminary Discourse, prefixed to the first volume of this work. We shall, therefore, proceed to note the alterations, by referring back to the commencement of the first volume.

Instead of the first nine pages of the Preliminary Discourse (part of which, namely, from page xxvii to xxxi, is transferred to page 149 of the first volume, as noted in page 22 of this Supplement), the Author has prefixed the following matter :

“ By following the progress which chemistry has not ceased to make during the last twenty years, we soon perceive that the theory of Stahl, shaken by the discovery of various elastic fluids and their properties, has for some time left the minds of chemists in suspense, and has given birth to theories almost as different from each other, as there are men seriously employed in this science. Among these philosophers, there is a considerable number, especially in the North, who have not joined any party, but continue to connect the theory of phlogiston with the newly discovered facts. But those who are acquainted with the whole of the science, will easily perceive, that this connection is not at all satisfactory, and that it requires forced applications, the inconsistency of which is soon perceived.

The doctrine adopted by several French chemists, at the head of whom we must place Mr. Lavoisier, who first laid the foundation and formed an idea of the whole together, is not subject to the same difficulties. Its simplicity, its methodical proceeding, its perspicuity, and the facility with which it explains
all

all the phenomena of chemistry, place it far above all those which at present divide the European philosophers who have not adopted it. This doctrine has been exposed at large in all the parts of this elementary work. But as it may be of advantage to exhibit a short and condensed view of the subject, I thought that, by uniting in a discourse of no great length the principles upon which it is founded, it would become more striking and clear to those who devote themselves to the study of this science; and that this discourse would be so much the more useful to them, as it exhibits a recapitulation of the great phenomena to which all the rest may be referred, as to general heads.

There is not a single experiment in chemistry in which one or the other of the two following phenomena does not happen. 1. Heat is disengaged or fixed. 2. An elastic fluid is formed, or absorbed. These two general facts being once established and clearly known, it will be seen, that the foundation of chemical theory depends on the properties and the action of heat, the formation and fixation of elastic fluids. It is, therefore, upon these two objects that our whole attention ought to be fixed.

*Concerning Heat, the Formation and Fixation of
elastic Fluids.*

ALTHOUGH the weight which has been hitherto undetermined of sensible heat, or of the combined or latent heat which we call caloric, cannot prove its material or particular existence, yet all the phenomena of chemistry unite in favour of the opinion, that it is a being or body self-existent, possessing constant properties or characters, and obeying invariable attractions in similar circumstances. Besides the sensation common to all men, which heat causes our organs to experience, philosophers have discovered distinctive properties which belong only to this being. Such is the rarefaction or separation of the particles which heat produces in all natural bodies; and which, by augmenting their volume, diminishes their attraction to each other, while it diminishes their specific gravity without adding to their mass, and increases their attraction for the particles of other bodies. The more caloric is accumulated in bodies, the more it is compressed or condensed, the more its particular attraction for these bodies increases, and the more their properties are changed. Fusion or liquefaction, volatilization or sublimation, the transition of liquids to the form of vapours or elastic fluids, are the constant effects of the penetration, or rather the combination, of heat. Solid or frozen water, by absorbing a certain
quantity

quantity of caloric, becomes liquid or flowing: a greater dose of this principle renders it invisible, and gives it the form of air. It cannot be doubted, but that liquid water is a compound of ice, and a determinate dose of caloric; and that water in vapour or gas is the same combination, with a larger proportion of caloric. Such is the general theory of the formation of all elastic fluids: they are all composed of a base more or less solid and caloric. As this last principle follows laws which are peculiar to it in its attractions, it quits one body to unite with another; or rather, the bodies to which caloric is united, having a stronger attraction for other bodies than that which they have for caloric, suffer this principle to escape in order to unite with those other bodies. There is not a single fact in chemistry which does not exhibit one or the other of these phenomena, relative to the disengagement or fixation of caloric, or rather to the disengagement or fixation of elastic fluids; and sometimes both the one and the other of these phenomena at once. We see, from this simple theory, which is nothing else but the enunciation of facts, that all elastic fluids ought to be distinguished by two names; the first of which expresses their aeriform combination with caloric; such are the generic names of air or gas (the former, when these fluids are proper for combustion and respiration; and the other, when they cannot serve

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that purpose); and the second is specific, and denotes the particular base of each gas or elastic fluid. We see, likewise, that, in order to present a general recapitulation of all the facts of chemistry, it is necessary to take a review of the elastic fluids which are either produced and disengaged, or fixed and absorbed in the various phenomena of this science.

All the elastic fluids, whose properties require to be here attended to, may be divided into four classes.

FIRST CLASS.

Here the divisions proceed as in page xxxii.

P. xxxiii.

The note at the foot of the page is left out.

P. xxxiv, l. 14.

Read, "manifestly owing to the simultaneous agency of these two principles."

P. xxxv, l. 16.

The words "so that the matter of fire does not move with great rapidity" are left out.

P. xxxvii, l. 11.

After the word "mercury," insert the words "silver, gold."

— last line but one.

For "never," read, "scarcely ever."

P. xliii,

P. xliii, l. 20.

The Author has transposed and altered the following sections, as follows :

V. " Carbonic acid gas is the first elastic fluid which was known. Dr. Black, who discovered its presence in chalk and alkalis, has proved, at the same time, that the effervescent property, the mildness and crystallizability of these substances, was owing to this elastic fluid ; that when deprived of it, alkaline substances became acrid, caustic, non-effervescent, &c. This gas exists in the air, of which it forms nearly the two hundredth part ; in acidulous waters, in certain subterraneous cavities, such as the Grotto del Cano, &c. its weight is nearly double that of the air of the atmosphere ; it has a penetrating smell, and a sour taste ; it extinguishes bodies in a state of inflammation, kills animals, reddens the tincture of turnsole, precipitates lime-water, renders chalk soluble in water, forms, with all alkaline matters, carbonates or a kind of crystallizable neutral salt, in which the alkaline properties are still perceptible, on account of the weakness of the acid. This acid gas, which is greatly concerned in the phenomena of nature and art, is a compound of carbone and oxigene ; the first in the dose of twenty-eight parts in the hundred, and the latter seventy-two. As carbone appears to be,

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of

of all known substances, that which has the strongest possible attraction for oxigene, the carbonic acid is one of the compounds the most difficultly destroyed, and which is most frequently produced in chemical analyses. It is formed in all cases wherein bodies which contain oxigene are heated with charcoal, as in the reduction of the various metallic oxides or calces, by means of oils, in charcoal itself, &c. by the decomposition of organic matters, which contain charcoal and water, &c.

VI. The sulphureous acid gas which is obtained, whether by burning sulphur very slowly, or by depriving the sulphuric acid of part of its oxigene, is a compound of sulphur and the oxygenous principle, in which this last principle is less abundant than in the sulphuric acid: this gas has the acrid and penetrating smell of sulphur, and a very sour taste; it extinguishes combustible substances which are ignited, and it destroys animals; it may be condensed into a liquid by extreme cold; it reddens and discolours most vegetable blues; it unites to water and ice, which it melts by virtue of the heat which this gas disengages during the time of its fixation: it gradually absorbs the atmospheric oxigene, and passes to the state of sulphuric acid.

VII. The fluoric acid gas is disengaged from the native fluuate of lime or vitreous spar, by the sulphuric acid; its taste and smell are
very

very strong; it dissolves siliceous earth, and holds it suspended in the aeriform and invisible state. The contact of water, by fixing it, separates a portion of this earth; alkali separates it entirely. Its nature is not known; and if this acid, like many other mineral acids, be a compound of a simple acidifiable base with oxigene, this acidifiable radical must have a very strong attraction for oxigene, since charcoal does not deprive it of it.

VIII. The muriatic acid gas is nothing but the muriatic acid, disengaged from water, and melted into an elastic fluid by heat. Its smell, which is lively and suffocating; its taste, which is very strong; its solubility in cold water, which absorbs it very readily, and separates the heat, which kept it melted; the peculiar neutral salts it forms with earthy and alkaline bases; the white vapour which is perceived when it comes in contact with the water of the atmosphere; are its characteristics. The intimate nature of its composition is not known; its acidifiable basis doubtless adheres very strongly to its oxigene, since its principles have not yet been separated. We shall proceed to shew that this acid has even the property of depriving many substances of the oxigene with which they are saturated."

It has already been remarked, page 52 of this Supplement, that the section VI. of the Preliminary Discourse, page xlvi, is transposed,

with alteration, to page 12 of Volume II. The ninth section proceeds as in page li.

“IX. The muriatic acid gas of Dr. Priestley,” &c.

P. liii, l. 1.

Read, “ammoniacal copper, and of fulminating gold.”

—— l. 3 (from the bottom).

Read, “fifteen parts absorb eighty-five.”

P. lvii, l. 13 (from the bottom).

Insert, “This phenomenon depends on the hydrogenous gas not requiring so elevated a temperature as the sulphur to take fire by the contact of inflammable bodies in a state of ignition.”

—— l. 6 (from the bottom).

Add, “If too large a quantity of these acids be used, more especially of the oxygenated muriatic acid, they burn the sulphur of this gas, and convert it into sulphuric acid; in which case no precipitate is afforded. This phenomenon takes place more especially in sulphureous waters, the precipitation of whose sulphur, by means of acids, requires that they should be used with caution.”

P. lviii, l. 12.

After the word “decomposition,” add, “by the air, by metallic solutions, and the difficulty which

which was formerly experienced in exhibiting their sulphur by simple acids, and as long as it was not suspected that they existed otherwise than in the state of a sulphure or hepar."

P. lviii, l. 3 (from the bottom).

Read, "unless they be very thick, and small quantities of the mixture be used."

P. lxii, l. 9.

Insert, "The existence of charcoal dissolved in this gas is demonstrated by its weight, and by the result of its combustion with vital air, which affords carbonic acid; it appears, likewise, that the charcoal gives to the hydrogenous gas the foetid smell which every one knows, or at least renders it stronger. The charcoal modifies," &c.

P. lxiv.

The Author has reduced the number of heads in this and the following page to 14. Number 9 is omitted; as is likewise number 13, and the paragraph numbered 14 is altered to "the various kinds of fermentation." The numbers are accordingly changed.

P. lxvi, l. 6.

Add, "But in order to obtain a more accurate idea, it is necessary to add to this mechanical cause the chemical attraction, or particular affinity of heat to bodies respectively."

P. lxviii, l. 12.

Add, "We may likewise take notice, that, as the oxigene is more or less solid, that is to say, more or less deprived of heat and light in the compounds, it enters into the bodies which take it up, being some of them capable of absorbing it in a more pure and solid state than the former: there will in this case be a disengagement of heat and even of light; this is the reason of the existence of these two phenomena in the detonations of nitre, in the apparent action of the nitric acid upon sulphur, charcoal, phosphorus, most of the metals, oils, alcohol, &c."

P. lxxi, l. 7.

Read, "is nearly in the same state of uncertainty."

——l. 2 (from the bottom).

After the word "theory," the rest of the paragraph runs thus: "of which we should then have acquired only half; for the other principles of alkalis would remain absolutely unknown; and we should be still ignorant more particularly of the difference between the radicals of potash and of soda, &c."

P. lxxii, l. 16.

After the words "mineral kingdom", read, "as well as the various doses of hydrogen and carbone, which appear to form the base
of

of all the vegetable acids, are still undiscovered."

P. lxxiii, l. 6.

The paragraph numbered 9 is left out.

P. lxxiv, l. 13 (from the bottom).

Add, "for example, from 15 to 40 parts of oxigene in the hundred parts of iron."

P. lxxv, l. 7 (from the bottom).

Read, "Some of the metals decompose only the vitriolic acid, without affecting the water; such are mercury, lead, &c. and these metals are not burned, unless the vitriolic acid be concentrated: but in the case where metals have more force to decompose the water than to decompose the vitriolic acid, as happens with zinc and iron, these metals do not readily become calcined, but," &c. as in line 3, page lxxvi.

P. lxxxix, l. 8 (from the bottom).

The Author has omitted all the matter from hence to line 8, inclusive, on page xci. The subject of the vegetable acids having been treated of at the commencement of the fourth volume, as is shewn in this Supplement, the Author connects his subject by inserting the following paragraph:

"We begin to acquire a notion of the formation of vegetable principles, during and by the very act of vegetation. We have already
announced,

announced, in the history of these acids, that they all appear to be formed of analogous bases; that in the last analysis they all alike afford carbone, hydrogene, and oxigene; and that they seem to differ only in the proportion of these principles, and their compression or density. This opinion becomes more probable, in proportion as experiments on these acids are multiplied.

Scheele and Crell have observed an analogy between many of them. Scheele, who at first thought the acids of sorrel and sugar very different from each other, has succeeded, as we have elsewhere observed, in proving that it is one and the same acid: 1. By removing the portion of vegetable alkali which masks the properties of the oxalic acid, in the acid of sorrel of commerce, and by reducing it by that means to the state of pure oxalic acid. 2. By changing the acid of sugar into acid of sorrel, by the addition of a small quantity of vegetable alkali.

If to this very important fact of vegetable analysis," and proceed as in line 22, page xcii.

P. xciii, l. 6 (from the bottom).

The words "and constitutes ardent spirit" are left out.

P. xciv, l. 3 (from the bottom).

Instead of the words "that the first forms the solid parts," read, "that this humour unites

by simple repose into a tissue of solid fibres."

The remainder of the fifth volume of the new edition consists of the tables of the new Nomenclature, and their explanation, to which we shall proceed. The Index, and tables of Natural History, are likewise transposed to the end of this volume. Two of these being new are subjoined to the present Supplement.

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E X P L A N A T I O N

O F T H E

T A B L E O F N O M E N C L A T U R E *.

WE shall first observe, that our intention in drawing up this Table has not been to offer the whole Nomenclature of Chemistry, but to unite, under several classes of compounds, a sufficient number of select examples, in order that, by means of a simple and easy study, our method of naming might be applied to all the compounds which are known to chemists, or to those which they may hereafter discover. To answer this purpose, we have divided our table into six perpendicular columns, at the head of which are placed the general titles, which announce the state of the bodies whose names are found therein.

Each of these columns is divided into 55 separate compartments, one beneath the other. This number is determined by that of the

* See Table II. at the end of this Supplement.

substances not yet decomposed which we are acquainted with, and which are inserted in the first column. The correspondent horizontal divisions of the five following columns, comprehend the principal combinations of these simple substances, and must therefore be equally numerous in each column.

We shall proceed to give an account of the principal circumstances which offer themselves in the consideration of these columns.

COLUMN THE FIRST.

The first column, marked by the Roman numeral I. is entitled, *Substances not decomposed*. We must here remark, that these bodies are simple to us only because we have not yet succeeded in analysing them. All the accurate experiments which have been made for the last ten years, shew that these bodies cannot be separated into substances of a more simple nature, and that they cannot be reproduced by artificial compositions. These substances are, as we have already observed, 55 in number. Opposite each of these is placed, in Arabian characters, the number which denotes the place of each body, and of its correspondent compounds in the other columns.

The horizontal lines are, therefore, by this disposition, continued absolutely from the first column to the sixth; and all the horizontal

compartments of each column are comprehended and denoted by the same number.

The 55 simple substances in the first column are divided into five classes, according to the comparative nature of each. The first division comprehends four bodies, which seem to approach nearest to the idea which has been formed of elements, and which perform the most active part in combinations: these are, light [1 compartment]; heat [2], hitherto called the matter of heat; oxigene [3], or that part of vital air which is fixed in bodies which burn, which augments their weight, changes their nature, and whose character or most eminent property being that it forms acids, has induced us to derive its name from this remarkable property: hydrogene [4], or the base of the elastic fluid called inflammable gas, a substance which exists in the solid form in ice, because it is one of the principles of water. These four first simple substances are connected by a bracket.

The second class of substances not yet decomposed in the first column comprehends twenty-six different bodies, all of which possess the property of becoming acid by their unions with the oxigene, and which, from this common character, we denote by the words acidifiable bases. Among these twenty-six bodies, there are only four which have yet been obtained simple and uncombined; these
are

are azote, or the nitric radical * [compartment 5], or the solid base of atmospheric mephitic, well known at present to chemists; pure charcoal, carbone, or the carbonic radical [6]; sulphur, or the sulphuric radical [7]; and phosphorus, or the phosphoric radical [8]. The twenty-two others are only known in their combinations with oxigene, and in the state of acids; but in order to give a greater degree of perspicuity and extent to the science, we have separated them from oxigene in idea, and we suppose them in that state of purity to which it is very probable that art will hereafter succeed in reducing them. They are all denominated by the names of their acids, with an uniform termination, which are followed by the generic word radical. Such is the manner in which the expressions, muriatic radical [compartment 9], boracic radical [10], fluoric radical [11], succinic radical [12], acetic radical [13], tartaric radical [14], pyrotartaric radical [15], oxalic radical [16], gallic radical [17], citric radical [18], malic radical [19], benzoic radical [20], pyrolignic radical [21], pyromucic radical [22], camphoric radical [23], lactic radical [24], saccholactic radical [25],

* It must here be observed, likewise, that azote has not been obtained alone and insulated, but combined with caloric, and in the state of gas.

formic radical [26], Prussic radical [27], sebacic radical [28], lithic radical [29], bombic radical [30], are to be understood.

The third class of the undecomposed bodies of column I. contains the metallic substances, which are seventeen in number, from the compartment 31 to 47, inclusive. All these possess the names by which they are known at present. The three first are capable of passing to the acid state, and are by this character related to the acidifiable bases which precede them.

In the fourth class of substances not decomposed, are placed the earths, silex [compartment 48], alumine [49], barytes [50], lime [51], magnesia [52]. These five earths have not yet been decomposed, and they must be considered as simple substances, in the present state of our knowledge.

Lastly, the fifth class of substances not decomposed includes the three alkalis, potash [compartment 53], soda [54], ammoniac [55]. Although this last has been already decomposed by Bergman and Sheele, and though Mr. Berthollett has precisely determined the nature and quantity of its principles, we have thought proper to arrange it beneath the fixed alkalis, of whose component parts there are hopes we shall speedily attain a knowledge; and in order to avoid interrupting the connection of these substances, which in many respects

act as substances not decomposable in the experiments of chemistry.

The first column, whose divisions have been here spoken of, is longitudinally divided into two parts, like all the others; the part on the right hand is appropriated to the ancient names, distinguished by the italic character.

COLUMN THE SECOND.

The second column is entitled, *Converted into the State of Gas by Caloric*. It is necessary to connect with this title that of the preceding column, and to read, *Substances not yet decomposed, converted into the State of Gas by Caloric*. It will hence be easily understood, that this second column is designed to exhibit the permanent aeriform state which several of the simple substances, enumerated in the first column, are capable of assuming. We find in the present column, no more than four elastic fluids, whose names, as well as all the words contained in the other columns, are derived from those of the undecomposed substances, and become simple and clear by the addition of the word gas, which precedes the former names. Thus we find, in the third compartment, oxygenous gas or vital air; in the fourth, hydrogenous gas; in the fifth, azotic gas; and in the fifty-fifth, ammoniacal gas. The ancient names are inserted in the adjoining opposite column.

COLUMN

COLUMN THE THIRD.

At the head of this column we read the words, *combined with oxigene*. It must constantly be supposed that the title of the first column is prefixed, and it is then perceived that the *substances not hitherto decomposed* are the things spoken of. This column is one of the fullest, because almost every substance in the first column is capable of combining with oxigene. When we cast our eyes over its disposition, and the names which it exhibits, we see immediately that these names are all composed of two words which express compounds of two substances; the latter of these words is the generic term of acid which indicates the saline character given by the oxigene; the former specifies each acid, and is almost always that of the radical indicated in the first column. The fifth compartment of this third column presents the union of azote, or the nitric radical, with oxigene, and there result three known compounds from this union of two bodies, according to the proportions of their principles. In fact, the azote either contains the least possible quantity of oxigene, and then forms the base of nitrous gas; or is saturated with it, and then constitutes the nitric acid; or it contains less oxigene than this last, but more than nitrous gas, and forms nitrous acid. We see that it is simply by changing the termination of the same

word, that we have expressed the three states of this combination. It is absolutely the same with regard to the sulphuric acid [compartment 7], the phosphoric acid [8], the acetic acid [13]. Each of these acids may exist in two states of combination with oxygen, according to the quantities which their radicals, or acidifiable bases, may contain. When their bases are completely saturated, the results are the sulphuric, acetic and phosphoric acids. When these bases are not saturated, and are, as it were, in excess with regard to the quantity of oxygen, we name them the sulphurous, acetic and phosphorous acids, as appears in the compartments already referred to. This termination serves thus to denote the state of the acids according to the names already employed, of vitriolic and sulphurous; and we adopt it as a rule equally general and simple for all the other acids which are in either of these states: it will be easy to understand, after this, the names of the carbonic acid [compartment 6], the boracic acid [10], and of all those which exhibit only a single state, in which the acidifiable base is saturated with oxygen. By the same law of this Nomenclature we understand that the acids which are placed alone in a compartment, and whose names terminate in *ous*, contain an excess of acidifiable matter; such are the tartarous acid [compartment 14], the pyrotartarous acid [15], the pyroligneous acid [21],
and

and the pyromucous acid [22]. The muriatic acid [compartment 9] is found in a different state from all the others; besides its acid combination saturated with oxigene, it is capable of acquiring an excess of this principle, and then obtains singular properties: to distinguish it in this peculiar state, we call it the oxygenated muriatic acid [column 9]; and this first simple name, whose value is well determined, may be hereafter applied to other acids, if they should be discovered to possess the property of becoming furcharged with oxigene.

The lower compartments of this third column, from 31 to 47 exclusively, exhibit the nomenclature of another system of bodies. We find the word oxide prefixed to the compound denomination; the reasons have been elsewhere explained, which have engaged us to substitute this name instead of metallic calces. It is easy to see that, without expressing the saline quality as the word acid does, this term, nevertheless, equally well denotes a combination of oxigene; besides which, it affords the advantage that it can be employed to denote all bodies capable of uniting with oxigene, and which, in this union, do not form acids, whether because the quantity of oxigene is not sufficiently abundant, or because their bases are not of an acidifiable nature. Thus, for example, the phosphoric acid, vitrified or deprived of a portion of oxigene by the action of a strong heat, is a kind of phosphoric oxide.

Nitrous gas, which is no more acid than phosphoric gas, because it does not contain a sufficient quantity of oxigene, is likewise a true nitrous oxide. So likewise hydrogene, united to oxigene, does not form an acid; but this union constitutes water, which, considered under the present point of view, may be regarded as an oxide of hydrogene.

Among the seventeen metallic oxides, which are exhibited from compartment 31 to 48, there are three which are intermediate between the metallic and acid states. It is for want of oxigene, that the oxides of arsenic [compartment 31], molybdena [32], and tungsten [33], are not yet acids. A greater quantity of this generative principle of acidity forms the arsenic, molybdic and tungstic acids in the same columns. It has been explained how epithets, taken from the colour or the processes, serve us to distinguish the several oxides of the same metal, as may be seen at the articles oxides of antimony [compartment 38], oxides of lead [42], and oxides of mercury [44], which afford the most numerous examples of this diversity.

COLUMN THE FOURTH.

The fourth column, whose title is, *Oxygenated and gaseous*, announces the simple substances, combined at the same time with oxigene and a sufficient quantity of caloric to convert them
into

into the state of permanent gas, at the usual pressure and temperature. This exhibits only six substances known to exist in this state; namely, nitrous gas, and nitrous acid gas [compartment 5], carbonic acid gas [6], sulphureous gas [7], muriatic acid and oxygenated muriatic acid gases [9], and the fluoric acid gas [11]. As no other of these oxygenated substances have been hitherto placed in the state of gas by caloric, most of the compartments of this last column are empty: we have availed ourselves of this circumstance to insert peculiar combinations of metallic oxides, or oxygenated metals with various substances; this column is, therefore, divided in the middle, and takes the new title of *Metallic Oxides, with various Bases*. The compartments 31, 32, 36, 37, 38, 39, 40, 41, 42, 43, 44, and 45, exhibit combinations of metallic oxides, with sulphur, and with the alkalis; the former bear the epithet of sulphurated oxides of arsenic and lead, and the latter that of alkaline metallic oxides: when any of these compounds vary in the proportions of the component parts, and consequently in their properties, we distinguish them like the simple oxides, by second epithets taken from their colour; thus we say, the grey, red, orange-coloured, &c. sulphurated oxides of antimony, compartment 38.

COLUMN THE FIFTH.

As the 5th column, which comprehends simple oxygenated substances with bases, or the neutral salts in general, offers a greater number of names than the foregoing: it appeared necessary to us to exhibit a greater number of examples to shew the advantage which this methodical Nomenclature possesses over the ancient names, most of which, though used to express similar compositions, were themselves entirely dissimilar.

A slight inspection of the compartments of this column will shew that an uniformity of termination prevails in all the names it contains, the constant use of which in our Nomenclature is to express analogous compounds. It is easy to conceive that this regular process will singularly facilitate the study of the science, and produce the greatest perspicuity in chemical works. The substances inserted in this 5th column are all compounds of three substances; acidifiable bases, the acidifying principle, or oxigene, and earthy alkaline, or metallic bases: nevertheless, their nature is pointed out by two words only; because the first, which is derived from that of the oxygenated, or acid combination, includes in itself the expression of this union, and the second belongs solely to the base which saturates the acid. All the names of these compounds are terminated

nated in *ate*, when they contain the acids in their state of complete saturation, by oxigene; their termination is in *ite*, when the acids are deprived of a certain quantity of oxigene. Upon inspecting the compartments of this column, from the 5th to the 34th, it will be seen that we have inserted a greater number of examples *, in proportion as the acids to which they correspond, or whose saline compounds they contain, are more known and used: these compartments exhibit some of the principal differences in the Nomenclature.

* The neutral salts are, at present, very numerous; twenty-nine known acids, each of which may be saturated by four soluble earths, three alkalis, and fourteen metallic oxides, which are not acidifiable (for it appears that the acidifiable oxides, such as those of arsenic, molybdena, and tungsten, cannot neutralize the mineral acids), form 609 species of compound salts. If we add that five of these acids, viz. the nitric, the sulphuric, the muriatic, the acetic, and the phosphoric, are likewise capable of entering into combinations, in their two different states, with neutralizable bases, and that several acids, such as the sulphuric, tartareous, oxalic, and arsenic acids, are capable of saturating various quantities of the bases, and forming what we call acidules, of which eight very distinct species are already known (such are the acidulous sulphate of potash, or vitriolated tartar with excess of acid; the acidulous tartarites, or oxalates of potash, of soda, of ammoniac, or the creams of tartar, and salts of sorrel, made artificially, with the pure tartareous and oxalic acids, united to a small quantity of alkaline bases, and the acidulous arseniate of potash, or the neutral arsenical salt of Macquer), we shall see that the number of neutral salts may be carried to as far as 722 species, whose denominations may be formed methodically, after the 46 or 48 examples of these salts, exhibited in the present table.

1. The

1. The greater number comprehend salts whose names are terminated in *ate*, as the carbonates [compartment 6], the fluates [11], the fuccinates [12], the gallates [17], the citrates [18], the malates [19], the benzoates [20], the camphorates [23], the lactates [24], the saccholates [25], the formiates [26], the prussiates [27], the sebates [28], the lithiates [29], the bombiates [30], the arseniates [31], the molybdates [32], the tungstates [33]. This identical and uniform termination of these eighteen genera of neutral salts, shews that the acids which constitute them are not known but in their state of complete saturation by the oxigene; these acids, therefore, in the third column are all terminated in *ic*, according to the rules of our Nomenclature.

2. In considering the compartments 14, 15, 21, and 22, of the 5th column, we find only the tartrites, pyrotartrites, pyrolignites, pyromucites, whose uniform termination denotes acids with excess of their acidifiable bases, and that they contain the tartareous, pyrotartareous, pyroligneous, and pyromucous acids.

3. There is, in the same column, a third class of compartments, in which we find, at the same time, neutral salts whose names have the two terminations here spoken of; such are the compartments 5, in which we find nitrates and nitrites; 7, which contains sulphates and sulphites; 8, which exhibits phosphates and
 2 phosphites;

phosphites; and 13, which includes the acetates and acetites: this double termination in each of the compartments sufficiently points out, from what we have before explained, that the salts to which we have applied them are formed by the same acid in two proportions of union with oxigene, always calling to mind that the acids terminating in *ic* form neutral salts terminated in *ate*, and that those whose termination is in *ous*, constitute neutral salts terminated in *ite*.

4. In several compartments of this column we have given examples of different neutral salts from those of the two classes hitherto distinguished. Thus, in compartment 9, we have distinguished by the name of oxygenated muriate of potash, the combination of the oxygenated muriatic acid with potash, a salt which is very different from the muriate of potash, and in which Mr. Berthollett has distinguished the property of detonating on burning coals. We have likewise, in other compartments of the same column, expressed the saline combinations in which the acids predominate, by adding to the methodical denominations of these salts, the epithet acidulous. Thus, in the compartment 14, we read acidulous tartrite of potash, and in 16, the acidulous oxalate of potash. Lastly, we have distinguished by the expression supersaturated, such salts in which the base predominates, as may be seen in the compartment 8, where we find

find supersaturated phosphate of soda; and 10, where we find borax or supersaturated borate of soda.

When it is considered how rigorous and etymological the method is which we have followed to denominate neutral salts, and the very small degree of coincidence among them in the names given to the like salts in the ancient nomenclature, it will be seen why this column exhibits the greatest number of variations and changes, though we have really made no other innovation than by adding two varied terminations to the names already known.

COLUMN THE SIXTH.

The 6th and last column of this table, which comprehends simple substances combined in their natural state, and without being oxygenated or acidified, as the title shews, is one of the shortest, and contains only a small number of compounds. The lower compartments, from 31 to 48, contain compounds of metals with each other, to which we preserve the names of alloys and amalgams, which have hitherto been adopted. Above these we find only three which exhibit a new nomenclature, founded on the same principles as the preceding. Compartment 6 exhibits the expression carbure of iron, which denotes the combination of charcoal in substance with iron, called plumbago. Compartment 7 exhibits the metallic sulphures,

phures, or the combinations of sulphur in substance with the metals; the alkaline sulphures, or combinations of sulphur with the alkalis; the sulphurated hydrogenous gas, or solution of sulphur in hydrogenous gas: and lastly, in compartment 8, we express by the generic name of metallic phosphures, the compounds of phosphorus in substance with the metals. Thus, instead of the word siderite, we substitute the expression phosphure of iron, which unequivocally denotes the union of phosphorus with iron. And we find, in these three comparable words, carbure, sulphure, and phosphure, which differ only in their termination from names which are very well known, a means of conveying an accurate idea of analogous compounds, and of distinguishing them from all other compounds.

Underneath these six columns we have placed numerically, the principal compound substances which constitute vegetables. In this part of the table we have chosen out of the ancient names those which by their simplicity and clearness enter completely into the views we have proposed.

Such is the method which we have followed in the assemblage of names comprehended in this table. After the easy study which the table requires on the part of such as are desirous of becoming acquainted with our plan, it will soon be perceived that we have invented only a very small number of words, if we except

cept those which were indispensably necessary to denote substances before unknown, such as are the newly-discovered acids. By following the order of the substances named in the first column, from which all the other names are derived, it will be seen that we have no other new words than oxigene, hydrogene, and azote. With regard to the words caloric, carbone, filex, and ammoniac, they, as well as their derivatives in the following columns, exhibit only slight changes from names already very well known and much used. We can, therefore, affirm, that our Nomenclature differs from the ancient almost entirely in its terminations only; and that, if from these changes there should result a greater facility in study, and greater perspicuity in expression; if, more especially, they should afford the means of avoiding every equivocal expression, as the trial which has already been made, in the years 1787 and 1788, in the lectures at the Royal Garden and the Lyceum, gives us reason to hope, the reformation which we propose, founded upon a simple method, cannot but be favourable to the progress of chemistry.

A D V E R T I S E M E N T

RESPECTING THE

T W O S Y N O N Y M A.

WE have thought proper to annex to the general table of the methodical Nomenclature, in which the whole of the system which we propose is exhibited, a table of Synonyma, at full length, of all the words made use of to express chemical preparations. We here present these Synonyma in the form of two dictionaries. In the first, the ancient terms are disposed according to their alphabetic order, and precede the new or adopted names which correspond with them. By the help of this dictionary it may not only be seen what names we have given to different chemical compounds, but likewise such persons as are not familiarized with the greater part of the
the

the preparations (as ancient names are very often little calculated to render them known) will find, by attending to the new names, a kind of definition of considerable perspicuity in the words themselves which compose these synonyma, to enable them easily to recollect the compounds spoken of.

The second dictionary is the reverse of the former, and we think it will not be less useful.

The new denominations are here presented in the alphabetic order, and are accompanied with all their ancient correspondent terms. In this table we have endeavoured to reunite the most complete synonyma, in order to remove those difficulties which beginners meet with in several other sciences, and in particular, botany and mineralogy, in which the immense quantity of different names given to the same thing has produced a degree of confusion and obscurity which the labours of the most indefatigable men have not yet been sufficient to clear up.

In this new dictionary we shew, that the same substance has often received eight, ten, or twelve different names; that most of these names have either little or no relation to the things they were applied to; which must have necessarily happened in a science whose first authors endeavoured only to cover it with a veil of mystery, and in the history of which we may trace different epochas, wherein the learned men who have cultivated it arrived only by
insensible

insensible degrees to the exact knowledge of the compounds. Nevertheless, to avoid too great prolixity and obscurity, we have been careful not to bring forward in this place the names formerly given to substances by the alchemists; which, being founded on chimerical or absurd ideas, have happily been forgotten since chemistry has associated with natural philosophy.

Each of these synonyma will, therefore, have its peculiar use. The first, which may serve as a dictionary to the works of chemistry hitherto published, will exhibit the methodical nomenclature adapted to each ancient word. In this, as well as in the following table, we have connected only the names of simple or compound bodies, or chemical preparations, and have brought forward none of those which denote the operations themselves, because we have made no change in these last words. The second synonymous table is more complete, and contains a greater number of words than the former, because it contains many compounds which are owing to the labours of the moderns; and which, some years ago, had no names. This nomenclature may, therefore, be considered, in some respects, as an inventory of our present acquisitions in chemistry.

In both tables synonymous terms will sometimes be seen among the new names: we

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preserve

preserve them, either with the view of not losing sight of some denominations in general use, or else to leave a choice of some expressions variously terminated, and designed to give variety to the expression, and to avoid a monotony, which might perhaps seem fastidious. Such is, for example, the termination of neutral salts, which presents their base either in the form of a substantive or adjective, as the writer chooses. There will likewise be found, in books of chemistry, some words not mentioned in the synonyma, because they have been given to compounds whose nature is not yet exactly known; and if the strict proceeding which we have adopted be well attended to, it will be seen that we could not give names to combinations which are imperfectly known.

We have added some definitions to several general or particular denominations, either because we had some doubts respecting the compounds spoken of, or because we were treating of bodies newly discovered.

The second table, which exhibits the new names in the alphabetical order, and our ancient synonyma, contains likewise a Latin translation of the new denominations. We have followed the same plan for the Latin words. Uniformity of termination, and the laws for the derivatives, have been always the two principles which have guided us in this

labour. It would have been incomplete if we had not offered to the learned of all nations the means of expressing themselves in an uniform manner, and of being easily understood. In proportion as the science shall acquire new lights, it will be easy to add proper names, according to the method which we have sufficiently explained in the preceding memoir.



ANCIENT AND NEW SYNONYMA,

IN ALPHABETICAL ORDER.

<i>Ancient Names.</i>		<i>New Names,</i>
	A.	
ACETOUS ammoniac	-	{ Acetite ammoniacal.
		{ ————— of ammoniac.
Acetous salt of clay	-	{ Acetite aluminous.
		{ ————— of alumine.
Acetous salt of copper	-	Acetite of copper.
Acetous salt of iron	-	Acetite of iron.
Acetous salt of lead	-	Acetite of lead.
Acetous salt of magnesia	-	Acetite of magnesia.
Acetous salt of mercury	-	Acetite of mercury.
Acetous salt of soda	-	Acetite of soda.
Acetous salt of tartar	-	Acetite of potash.
Acetous salt of zinc	-	Acetite of zinc.
Acid acetous	-	Acetous acid.
Acid aërial	-	Carbonic acid.
Acid of alum	-	Sulphuric acid.
Acid of amber	-	Succinic acid.
Acid of ants	-	Formic acid.
Acid of apples	-	Malic acid.
Acid arsenical	-	Arsenic acid.
Acid of benzoin	-	Benzoic acid.
Acid boracic	-	Boracic acid.
Acid of borax	-	Boracic acid.
Acid of chalk	-	Carbonic acid.
Acid of charcoal	-	Carbonic acid.
Acid cretaceous	-	Carbonic acid.
	X 3	Acid

*Ancient Names.**New Names.*

Acid of fat	- - -	Sebacic acid.
Acid of galls	- - -	Gallic acid.
Acid of galls alcoholized	- - -	Gallic alcohol.
Acid of lemons	- - -	Citric acid.
Acid lignic, or of box	- - -	Pyroligneous acid.
Acid malusian	- - -	Malic acid.
Acid marine	- - -	Muriatic acid.
Acid marine dephlogisticated	- - -	Oxygenated muriatic acid.
Acid mephitic	- - -	Carbonic acid.
Acid of molybdena	- - -	Molybdic acid.
Acid of muria	- - -	Muriatic acid.
Acid of nitre	- - -	Nitric acid.
Acid of nitre pale or colourless	- - -	Nitric acid.
Acid of nitre deprived of its gas	- - -	Nitric acid.
Acid of nitre dephlogisticated	- - -	Nitric acid.
Acid of nitre phlogisticated	- - -	Nitrous acid.
Acid perlate	- - -	{ Superfaturated phosphate of soda.
Acid of phosphorus dephlogisticated	- - -	} Phosphoric acid.
Acid of phosphorus phlogisticated	- - -	
Acid of sea-salt	- - -	Muriatic acid.
Acid of silk-worms	- - -	Bombic acid.
Acid of spar or fluor	- - -	Fluoric acid.
Acid of sugar	- - -	Oxalic acid.
Acid of sulphur	- - -	Sulphuric acid.
Acid of tungstein or tungsten	- - -	Tungstic acid.
Acid of wolfram of Messrs. Delhuyar	- - -	} Tungstic acid.
Acid saccharine	- - -	
Acid saccholaëtic, or acid of the sugar of milk	- - -	Saccholaëtic acid.
Acid sebaceous, or of fat	- - -	Sebacic acid.
Acid sedative, or narcotic, of Homberg	- - -	} Boracic acid.
Acid sulphureous	- - -	
Acid syrupous	- - -	Pyromucous acid.
Acid tartareous	- - -	Tartareous acid.
Acid vitriolic	- - -	Sulphuric acid.
Acid phlogisticated vitriolic	- - -	Sulphureous acid.
Acidum pingue	- - -	{ The hypothetical principle of Meyer.
Affinities	- - -	
		Chemical affinities or attractions.
		Aggregation

Ancient Names.

New Names.

Aggregation	-	-	-	Aggregation.
Air alkaline	-	-	-	Ammoniacal gas.
Air atmospherical, or com-	-	-	-	Atmospherical or common air.
mon air	-	-	-	
Air dephlogisticated, of Dr.	-	-	-	Oxygenous gas or vital air.
Priestley	-	-	-	
Air, dephlogisticated marine	-	-	-	Oxygenated muriatic acid gas.
acid	-	-	-	
Air factitious	-	-	-	Carbonic acid gas.
Air, fœtid, of sulphur	-	-	-	Sulphurated hydrogenous gas.
Air, fire, of Scheele	-	-	-	Oxygenous gas.
Air, fixed, of Dr. Black	-	-	-	Carbonic acid gas.
Air impure	-	-	-	Azotic gas.
Air inflammable	-	-	-	Hydrogenous gas.
Air, marine acid	-	-	-	Muriatic acid gas.
Air nitrous	-	-	-	Nitrous gas.
Air phlogisticated	-	-	-	Azotic gas.
Air pure	-	-	-	Oxygenous gas, or vital air.
Air, solid, of Hales	-	-	-	Carbonic acid gas.
Air vitiated	-	-	-	Azotic gas.
Air vital	-	-	-	Oxygenous gas.
Air, vitriolic acid, of Dr. Priestley	-	-	-	Sulphureous acid gas.
Alkahest	-	-	-	{ The universal solvent of the alchemists.
Alkahest of Respour	-	-	-	
Alkahest of Van Helmont	-	-	-	{ Potash mixed with oxide of zinc.
Alkalis in general	-	-	-	Carbonate of potash.
Alkalis aerated	-	-	-	Alkalis.
Alkalis caustic	-	-	-	Alkaline carbonates.
Alkalis effervescent	-	-	-	Alkalis.
Alkali, fixed, of tartar, caustic	-	-	-	Alkaline carbonates.
Alkali, fixed, of tartar, not caustic	-	-	-	Potash.
Alkali, fixed vegetable	-	-	-	Carbonate of potash.
Alkali marine, caustic	-	-	-	Carbonate of potash.
Alkali marine, not caustic	-	-	-	Soda.
Alkali mineral acetated	-	-	-	Carbonate of soda.
Alkali mineral aerated	-	-	-	Acetite of soda.
Alkali phlogisticated	-	-	-	Carbonate of soda.
Alkali Prussian	-	-	-	{ Ferruginous prussiate of pot- ash, not saturated.
Alkali urinous	-	-	-	
Alkali vegetable aerated	-	-	-	Ferruginous prussiate of potash.
				{ Carbonate of ammoniac.
				{ Ammoniacal carbonate.
				Carbonate of potash.

<i>Ancient Names.</i>		<i>New Names.</i>
Alkali volatile acetated	—	{ Ammoniacal acetite. Acetite of ammoniac.
Alkali volatile mild	—	{ Ammoniacal carbonate. Carbonate of ammoniac.
Alkali volatile fluor	—	Ammoniac.
Alkali volatile caustic	—	Ammoniac.
Alkali volatile concrete	—	Ammoniacal carbonate.
Alkali volatile mephitized	—	Carbonate of ammoniac.
Alloy or alloy of metals	—	Alloy.
Alum	—	{ Sulphate of alumine. Aluminous sulphate.
Alum marine	—	{ Muriate of alumine. Aluminous muriate.
Alum nitrous	—	{ Nitrite of alumine. Aluminous nitrite.
Amalgam of bismuth	—	Amalgam of bismuth.
Amalgam of copper	—	Amalgam of copper.
Amalgam of gold	—	Amalgam of gold.
Amalgam of lead	—	Amalgam of lead.
Amalgam of silver	—	Amalgam of silver.
Amalgam of tin	—	Amalgam of tin.
Amalgam of zinc	—	Amalgam of zinc.
Amber yellow	—	Amber or succinum.
Antimony crude	—	Sulphure of antimony.
Antimony diaphoretic	—	{ White oxide of antimony by nitre.
Aqua fortis	—	Nitric acid of commerce.
Aqua regia	—	Nitro-muriatic acid.
Aqua stygia	—	{ Nitro-muriatic acid, by the ammoniacal muriate.
Aquila alba	—	{ Mild sublimated mercurial muriate.
Arbor Dianæ	—	Crytallized amalgam of silver.
Arcanum corallinum	—	{ Red oxide of mercury, by the nitric acid.
Arcanum duplicatum	—	Sulphate of potash.
Argil pure, or argillaceous earth	—	Alumine.
Argil cretaceous	—	Aluminous carbonate.
Argil sparry	—	{ Aluminous fluat. Fluat of alumine.
Arsenic, regulus of	—	Arsenic.
Arsenic, white calx of	—	Oxide of arsenic.
Arsenic red	—	{ Red sulphurated oxide of arsenic.

Arseniate

*Ancient Names.**New Names.*

Arseniate of potash	—	Arseniate of potash.
Attractions elective	—	Elective attractions.
Azure of cobalt, or of the four fires	—	{ Vitreous oxide of cobalt and filex.

B.

Balsams of Bucquet	—	Balsams.
Balsam of sulphur	—	Sulphure of volatile oil.
Barilla	—	Carbonate of soda.
Barytes	—	Barytes.
Barytes effervescent	—	Carbonate of barytes.
Base of vital air	—	Oxigene.
Base of marine salt	—	Soda.
Benzoin or benjamin	—	Benzoin.
Benzoic salts	—	Benzoates.
Bezoar mineral	—	Oxide of antimony.
Bismuth	—	Bismuth.
Bismuth muriated	—	Muriate of bismuth.
Bitumen	—	Bitumen.
Black lead	—	Carbure of iron.
Blue, Berlin	—	Prussiate of iron.
Blue, Prussian	—	Prussiate of iron.
Borax	—	{ Borax of soda, or borate su- peraturated with soda.
Borax ammoniacal	—	Ammoniacal borate.
Borax of zinc	—	Borate of zinc.
Borax argillaceous	—	Aluminous borate.
Borax barytic or ponderous	—	Borate of barytes.
Borax calcareous	—	{ Borate of lime. Calcareous borate.
Borax magnesian	—	{ Magnesian borate. Borate of magnesia.
Borax martial	—	Borate of iron.
Borax mercurial	—	Borate of mercury.
Borax vegetable	—	Borate of potash.
Borax of antimony	—	Borate of antimony.
Butter of antimony	—	Sublimated muriate of antimony.
Butter of arsenic	—	Sublimated muriate of arsenic.
Butter of bismuth	—	Sublimated muriate of bismuth.
Butter of cobalt	—	Sublimated muriate of cobalt.
Butter of copper	—	Sublimated muriate of copper.
Butter of tin	—	Sublimated muriate of tin.

Butter

*Ancient Names.**New Names.*

Butter of tin, solid, of Mr. Baumé	Concrete muriate of tin.
Butter of zinc	Sublimated muriate of zinc.
Brass	Brass; alloy of copper and zinc.

C.

Calces metallic	—	—	Metallic oxides.
Calx of antimony vitrified	—	—	Vitreous oxide of antimony.
Cameleon mineral	—	—	Oxide of manganese and potash.
Camphor	—	—	Camphor.
Camphoric salts	—	—	Camphorates.
Cauticum	—	—	Meyer's hypothetical principle.
Cauticum lunare	—	—	Fused nitrate of silver.
Ceruse	—	—	{ White oxide of lead by the acetous acid, mixed with carbonate of lime.
Ceruse of antimony	—	—	{ White oxide of antimony by precipitation.
Chalk	—	—	{ Chalk, carbonate of lime. Calcareous carbonate.
Charcoal pure	—	—	Carbone.
Cinnabar	—	—	{ Sulphurated red oxide of mercury.
Clay	—	—	{ Clay; a mixture of alumine and silice.
Cobalt	—	—	Cobalt.
Colcothar	—	—	{ Red oxide of iron by the sul- phuric acid.
Copper	—	—	Copper.
Copper acetated	—	—	Acetate of copper.
Copperas green	—	—	Sulphate of iron.
Copperas blue	—	—	Sulphate of copper.
Copperas white	—	—	Sulphate of zinc.
Cream of tartar	—	—	Acidulous tartrate of potash.

D.

Diamond	—	—	Diamond.
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E.

*Ancient Names.**New Names.*

Earth, acetated calcareous	—	Calcareous acetite.
Earth, aerated ponderous	—	Carbonate of barytes.
Earth animal	— —	Calcareous phosphate.
Earthy base of ponderous spar		Barytes.
Earth calcareous	— — —	Lime, or calcareous earth.
Earth of alum	— — —	Alumine.
Earth animal	— — —	Phosphate of lime.
Earth calcareous	— — —	Lime, or calcareous earth.
Earth magnesian	— — —	Carbonate of magnesia.
Earth muriatic, of Kirwan	—	Magnesia.
Earth ponderous	— — —	Barytes.
Earth siliceous	— — —	Siliceous earth, or flint.
Emetic tartar	— — —	Antimoniated tartarite of potash.
Empyrean air	— — —	Oxygenous gas.
Essences	— — —	Volatile oils.
Ether acetous	— — —	Acetic ether.
Ether marine	— — —	Muriatic ether.
Ether nitrous	— — —	Nitric ether.
Ether vitriolic	— — —	Sulphuric ether.
Ethiops martial	— — —	Black oxide of iron.
Ethiops mineral	— — —	{ Black sulphurated oxide of mercury.
Ethiops per se	— — —	Blackish mercurial oxide.
Extract	— — —	Extract.

F.

Fecula of vegetables	—	Fecula.
Flowers, ammoniacal cupreous		{ Sublimated ammoniacal mu- riate of copper.
Flowers argentine, of regulus of antimony.		{ Sublimated oxide of antimony.
Flowers metallic	— — —	Sublimated metallic oxides.
Flowers of arsenic	— — —	Sublimated oxide of arsenic.
Flowers of benzoin	— — —	Sublimated benzoic acid.
Flowers of bismuth	— — —	Sublimated oxide of bismuth.
Flowers of sulphur	— — —	Sublimated sulphur.
Flowers of tin	— — —	Sublimated oxide of tin.
Flowers of zinc	— — —	Sublimated oxide of zinc.
Fluids aeriform	— — —	Gases.
Fluids elastic	— — —	Gases.

Fluor

*Ancient Names.**New Names.*

Fluor ammoniacal	—	{ Fluuate of ammoniac.
		{ Ammoniacal fluuate.
Fluor argillaceous	—	{ Aluminous fluuate.
		{ Fluuate of alumine.
Fluor of magnesia	—	Fluuate of magnesia.
Fluor of potash	—	Fluuate of potash.
Fluor of soda	—	Fluuate of soda.
Fluor ponderous	—	Barytic fluuate.

G.

Gas	—	Gas.
Gas, acetous acid	—	Acetous acid gas.
Gas, ærial muriatic acid	—	Oxygenated muriatic acid gas.
Gas alkaline	—	Ammoniacal gas.
Gas, cretaceous acid	—	Carbonic acid gas.
Gas hepatic	—	Sulphurated hydrogenous gas.
Gas inflammable	—	Hydrogenous gas.
Gas, inflammable carbonated		Carbonated hydrogenous gas.
Gas, inflammable of marshes	—	{ Marsh hydrogenous gas (mix-
		{ ture of carbonated hydro-
		{ genous gas and azotic gas).
Gas mephitic	—	Carbonic acid gas.
Gas, marine acid	—	Muriatic acid gas.
Gas nitrons	—	Nitrous gas.
Gas phlogiticated	—	Azotic gas.
Gas phosphoric, of Mr. Gen-	}	Phosphorated hydrogenous gas.
gembre		
Gas of Prussian blue	—	Prussic acid gas.
Gas, sparry acid	—	Fluoric acid gas.
Gas, sulphureous	—	Sulphureous acid gas.
Gas sylvestre, of Helmont	—	Carbonic acid gas.
Gilla vitrioli	—	Sulphate of zinc.
Glutinous matter of wheat		Gluten.
Gold	—	Gold.
Gold muriated	—	Muriate of gold.
Gold fulminating	—	Ammoniacal oxide of gold.

H.

Hepars	—	Sulphures.
Heat latent	—	Caloric.

I.

Ancient Names.

New Names.

Ink sympathetic by cobalt.		Muriate of cobalt.
Iron, or mars.	—	Iron.
Iron aërated	—	Carbonate of iron.
Iron acetated	—	Acetite of iron.
Jupiter	—	Tin.

K.

Kermes mineral	—	{ Red sulphurated oxide of anti-
		mony.

L.

Lapis infernalis	—	Fused nitrate of silver.
Lead, or saturn	—	Lead.
Lead muriated	—	Muriate of lead.
Lead sparry	—	Carbonate of lead.
Lead subacetated	—	{ White oxide of lead by the
		acetous acid.
Lead superacetated	—	Acetite of lead.
Lemon-juice	—	Citric acid.
Ley of soap	—	Solution of soda.
Lignic salts	—	Pyro-lignites.
Lilium Paracelsi	—	Alcohol of potash.
Lime-water	—	Lime-water.
Lime-water, Prussian	—	Prussiate of lime.
Liquor, Boyle's fuming	—	Ammoniacal sulphur.
Liquor, Silicum	—	Siliciated potash, in solution.
Liquor, Libavius's fuming	—	Fuming muriate of tin.
Liquor saturated with the	}	Prussiate of potash.
colouring matter of Prussian blue.		
Litharge	—	{ Semi-vitreous oxide of lead,
		or litharge.
Light	—	Light.
Liver of antimony	—	Sulphurated oxide of antimony.
Liver of arsenic.	—	Arfenical oxide of potash.
Livers of sulphur	—	Alkaline sulphures.
Livers of sulphur, earthy	—	Earthy sulphures.

Liver

<i>Ancient Names.</i>	<i>New Names.</i>
Liver of sulphur, antimoniated	Antimoniated alkaline sulphure.
Liver of sulphur, calcareous	{ Calcareous sulphure. Sulphure of lime.
Liver of sulphur, barytic —	{ Barytic sulphure. Sulphure of barytes.
Liver of sulphur, magnesian	{ Sulphure of magnesia. Magnesian sulphure.
Liver of sulphur, volatile alkaline —	{ Ammoniacal sulphure. Sulphure of ammoniac.
Luna cornea — —	Muriate of silver.

M.

Magistery of bismuth —	{ Oxide of bismuth by the nitric acid.
Magistery of lead —	Precipitated oxide of lead.
Magistery of sulphur —	Precipitated sulphur.
Magnesia alba —	Carbonate of magnesia.
Magnesia aerated, of Bergman —	Carbonate of magnesia.
Magnesia black — —	Black oxide of manganese.
Magnesia caustic —	Magnesia.
Magnesia cretaceous —	Carbonate of magnesia.
Magnesia effervescent —	Carbonate of magnesia.
Magnesia fluorated —	Fluate of magnesia.
Magnesia sparry —	Fluate of magnesia.
Malusite salts — —	Malites of potash, of soda, &c.
Manganese — —	Manganese.
Massicot — —	Yellow oxide of lead.
Matter of heat — —	Caloric.
Matter of fire — —	{ This term has been used to signify light, caloric, and phlogiston.
Matter pearly of Kerkringius —	{ White oxide of antimony by precipitation.
Matter colouring of Prussian blue }	Prussic acid.
Mephitized metals, earths, &c. —	Carbonates of metals, &c.
Mephitis atmospherical —	Azotic gas.
Mercury — —	Mercury.
Mercury acetated —	Acetite of mercury.
Mercurius dulcis —	Mild mercurial muriate.

Mercury.

Ancient Names.

New Names.

Mercury, white precipitate of			{ Mercurial muriate by precipitation.
Mercury of metals	—		Beccher's hypothetical principle.
Minium	—	—	Red oxide of lead, or minium.
Molybdena	—	—	Molybdena.
Molybdena, saline compounds of			Molybdates.
Mother water	—	—	Deliquescent saline residue.
Mucilage	—	—	Mucus.
Muriated metals		—	Muriates of different metals.
Muriated gold, or reguline			} Muriate of gold.
salt of gold			

N.

Natron, or natrum	—		Carbonate of soda.
Nitre	—	—	Nitrate of potash, or nitre.
Nitre ammoniacal		—	Ammoniacal nitrate.
Nitre argillaceous		—	Nitrate of alumine.
Nitre calcareous		—	{ Nitrate of lime.
			{ Calcareous nitrate.
Nitre cubic	—	—	Nitrate of soda.
Nitre fixed	—	—	Carbonate of potash.
Nitre lunar	—	—	Nitrate of silver.
Nitre of arsenic	—	—	Nitrate of arsenic.
Nitre of bismuth		—	Nitrate of bismuth.
Nitre of cobalt	—	—	Nitrate of cobalt.
Nitre of copper	—	—	Nitrate of copper.
Nitre of iron	—	—	Nitrate of iron.
Nitre of lead	—	—	Nitrate of lead.
Nitre of magnesia	—	—	Nitrate of magnesia.
Nitre of manganese		—	Nitrate of manganese.
Nitre of nickel	—	—	Nitrate of nickel.
Nitre of ponderous earth		—	{ Barytic nitrate.
			{ Nitrate of barytes.
Nitre of silver	—	—	Nitrate of silver.
Nitre of tin	—	—	Nitrate of tin.
Nitre of zinc	—	—	Nitrate of zinc.
Nitre prismatic	—	—	Nitrate of potash.
Nitre quadrangular		—	Nitrate of soda.
Nitre rhomboidal	—	—	Nitrate of soda.
Nitre saturnine	—	—	Nitrate of lead.

O. Ochre

O.

<i>Ancient Names.</i>		<i>New Names.</i>
Ochre	— — —	Yellow oxide of iron.
Oil of lime	— — —	Calcareous muriate.
Oil of tartar per deliquium	—	{ Potash in deliquescence mixed with carbonate of potash.
Oil of vitriol	— — —	Sulphuric acid.
Oils ethereal	— — —	Volatile oils.
Oils animal	— — —	Volatile animal oils.
Oils empyreumatic	— — —	Empyreumatic oils.
Oils essential	— — —	Volatile oils.
Oils by expression	— — —	Fixed oils.
Oils fat	— — —	Fixed oils.
Oils unctuous	— — —	Fixed oils.
Oleum philosophorum	— — —	Fixed empyreumatic oils.
Ore of antimony	— — —	Native sulphure of antimony.
Ore of iron, of marshes	—	{ Iron ore, containing phos- phate of iron.

P.

Pewter	— — —	Alloy of copper and tin; pewter.
Phlogiston	— — —	Stahl's hypothetical principle.
Phosphoric sal ammoniac	— — —	{ Ammoniacal phosphate. Phosphate of ammoniac.
Phosphoric salt of barytes	—	{ Phosphate of barytes. Barytic phosphate.
Phosphoric salt of magnesia	— — —	Magnesian phosphate.
Phosphoric salt of potash	— — —	Phosphate of potash.
Phosphoric salt of soda	— — —	Phosphate of soda.
Phosphorus of Baldwin	— — —	Dry calcareous nitrite.
Phosphorus of Kunckel	— — —	Phosphorus.
Phosphorus of Homberg	— — —	Dry calcareous muriate.
Platina	— — —	Platina.
Plumbago	— — —	Carbure of iron.
Pompholix	— — —	Sublimated oxide of zinc.
Potash	— — —	Impure carbonate of potash.
Powder of algaroth	—	{ Oxide of antimony by the muriatic acid.
Powder of Count de Palma	— — —	Carbonate of magnesia.
Powder of Sentinelly	— — —	Carbonate of magnesia.

Precipitate,

Ancient Names.

New Names.

Precipitate golden, or purple, of Cassius	—	Oxide of gold precipitated by tin.
Precipitate red	—	{ Red oxide of mercury by the nitric acid.
Precipitate per se	—	Red oxide of mercury by fire.
Precipitate yellow	—	{ Yellow oxide of mercury by the sulphuric acid.
Precipitate white by the muriatic acid	—	{ Muriate of mercury by precipitation.
Principle acidifying	—	Oxigene.
Principle astringent	—	Gallic acid.
Principle inflammable.		

See Phlogiston.

Principle mercurial	—	{ Beccher's hypothetical principle.
Principle of charcoal	—	Carbone.
Principle forbile of Ludbock	—	Oxigene.
Prussite calcareous	—	{ Calcareous prussiate.
		{ Prussiate of lime
Prussite of soda	—	Prussiate of soda.
Pyrites of copper	—	Sulphure of copper.
Pyrites martial	—	Sulphure of iron.
Pyrophorus of Homberg	—	{ Carbonated sulphure of alumine.
		{ Pyrophorus of Homberg.

R.

Realgar	—	{ Red sulphurated oxide of arsenic.
Realgites, salts formed with aqua regia	—	{ Nitro-muriates.
Regulus	—	{ A word used to signify the metallic state.
Regulus of antimony	—	Antimony.
Regulus of arsenic	—	Arsenic
Regulus of cobalt	—	Cobalt.
Regulus of manganese	—	Manganese.
Regulus of molybdena.	—	Molybdena.
Regulus of syderite	—	Phosphure of iron.
Refins	—	Refins.
Rust of copper	—	Green oxide of copper.
Rust of iron	—	Carbonate of iron.
Ruby of antimony	—	{ Vitreous brown sulphurated oxide of antimony.

Y

S. Saffron

S.

<i>Ancient Names.</i>		<i>New Names.</i>
Saffron of mars	—	Oxide of iron.
Saffron of mars, aperitive	—	Carbonate of iron.
Saffron of mars, astrigent	—	Brown oxide of iron.
Saffron of metals	—	{ Semi-vitreous sulphurated oxide of antimony.
Sal ammoniac	—	{ Ammoniacal muriate.
		{ Muriate of ammoniac.
Sal ammoniac fixed	—	{ Calcareous muriate.
		{ Muriate of lime.
Sal de duobus	—	Sulphate of potash.
Sal polychrest of Glafer	—	Sulphate of potash.
Sal polychrest of Rochelle	—	Tartrite of soda.
Sal sodæ. <i>See Soda.</i>		
Salt acetous ammoniacal	—	{ Ammoniacal acetite.
		{ Acetite of ammoniac.
Salt acetous calcareous	—	{ Calcareous acetite.
		{ Acetite of lime.
Salt acetous magnesian	—	{ Magnesian acetite.
		{ Acetite of magnesia.
Salt acetous martial	—	Acetite of iron.
Salt acetous mineral	—	Acetite of soda.
Salt acetous argillaceous	—	Aluminous acetite.
Salt acetous of zinc	—	Acetite of zinc.
Salt ammoniacal cretaceous	—	Ammoniacal carbonate.
Salt ammoniacal fixed	—	{ Calcareous muriate.
		{ Muriate of lime.
Salt ammoniacal nitrous	—	Nitrate of ammoniac.
Salt ammoniacal (secret of Glauber)	—	{ Sulphate of ammoniac.
Salt ammoniacal sedative	—	Ammoniacal borate.
Salt ammoniacal sparry	—	Fluate of ammoniac.
Salt ammoniacal vitriolic	—	Ammoniacal sulphate.
Salt bitter purging	—	{ Magnesian sulphate.
		{ Sulphate of magnesia.
Salt common	—	Muriate of soda.
Salt febrifuge of Sylvius	—	Muriate of potash.
Salt fusible of urine	—	{ Phosphate of soda and ammoniac.
Salt, Glauber's	—	Sulphate of soda.
Salt marine argillaceous	—	{ Aluminous muriate.
		{ Muriate of alumine.

*Ancient Names.**New Names.*

Salt marine calcareous	—	{ Calcareous muriate. Muriate of lime.
Salt marine magnesian	—	{ Magnesian muriate. Muriate of magnesia.
Salt marine of iron	—	Muriate of iron.
Salt marine of zinc	—	Muriate of zinc.
Salt native of urine	—	{ Phosphate of soda and am- moniac.
Salt, neutral arsenical, of } Macquer		Acidulous arseniate of potash.
Salt of alembroth	—	Ammoniaco-mercurial muriate.
Salt of amber, obtained by } crystallization		Crystallized succinic acid.
Salt of calcothar	—	{ Sulphate of iron, in a state little known.
Salt of Epsom	— —	Sulphate of magnesia.
Salt of jupiter	— —	Muriate of tin.
Salt of milk	— —	Sugar of milk.
Salt of Scheidschutz	—	Magnesian fulphate.
Salt of Sedlitz	—	Sulphate of magnesia.
Salt of Segner	—	Sebate of potash.
Salt of Seignette	—	Tartrite of soda.
Salt of forrel.	—	Acidulous oxalate of potash.
Salt of wisdom	—	Ammoniaco-mercurial muriate.
Salt of wormwood, common	—	Carbonate of potash.
Salt-petre	— —	Nitrate of potash; or nitre.
Salt reguline of gold	—	Muriate of gold.
Salt sedative	— —	Boracic acid.
Salt sedative mercurial	—	Borate of mercury.
Salt sedative sublimated	—	Sublimated boracic acid,
Salt stanno-nitrous	—	Nitrate of tin.
Salt sulphureous, of Stahl	—	Sulphite of potash.
Salt vegetable	—	Tartrite of potash.
Salt volatile of amber	—	Sublimated succinic acid.
Salt, wonderful pearly.	—	{ Superaturated phosphate of soda.
Saturn	— —	Lead.
Selenite	— —	Sulphate of lime.
Silver	— —	Silver.
Silver muriated	—	Muriate of silver.
Silver supernitrated	—	Fused nitrate of silver.
Snow of antimony	—	{ White sublimated oxide of antimony.
Soaps acid	— —	Acid soaps.

*Ancient Names.**New Names.*

Soaps alkaline	————	Alkaline soaps.
Soaps earthy, of Mr. Berthollett	————	Earthy soaps.
Soaps metallic, of Mr. Berthollett	————	} Metallic soaps.
Soap of Starkey	————	
Soda caustic	— — —	Saponul of potash.
Soda cretaceous	————	Soda.
Spanish white	— — —	Carbonate of soda.
Spar ammoniacal	————	{ White oxide of lead by the acetous acid.
Spar calcareous	————	
Spar fluor	— — —	Ammoniacal fluat.
Spar ponderous	————	Carbonate of lime.
Spirits acid	— — —	Calcareous fluat.
Spirit acid of wood	————	Sulphate of barytes.
Spirit alkaline volatile	— — —	Acids diluted with water.
Spirit ardent	— — —	Pyroligneous acid.
Spirit of Mindererus	————	Ammoniacal gas.
Spirit of nitre	— — —	Alcohol.
Spirit of nitre dulcified	— — —	Ammoniacal acetite.
Spirit of nitre fuming	— — —	Nitric acid diluted with water.
Spirit of salt	————	Nitric alcohol.
Spirit of sal ammoniac	— — —	Nitrous acid.
Spirit of venus	————	Muriatic acid.
Spirit of vitriol	————	Ammoniac.
Spirit of wine	————	Acetic acid.
Spiritus rector	————	{ Sulphuric acid diluted with water.
Spirit volatile of sal ammoniac	————	
Spiritus sylvestris, of Helmont	————	Alcohol.
Stone of the bladder	— — —	Aroma.
Sublimate corrosive	— — —	Ammoniac diluted with water.
Sugar	— — —	Carbonic acid.
Sugar candied	————	Lithic acid.
Sugar of lead	— — —	Corrosive muriate of mercury.
Sugar or salt of milk	— — —	Sugar.
Sulphur	— — —	Sugar.
Sulphur golden of antimony	————	Crytallized sugar.
Syderite	— — —	Acetite of lead.
Syderotete of Mr. de Morveau	————	Sugar of milk.
		Sulphur.
		{ Orange-coloured sulphurated oxide of antimony.
		Phosphate of iron.
		Phosphure of iron.

T.

Ancient Names.

New Names.

Tartar	—	—	Acidulous tartrite of potash.
Tartar ammoniacal	————	—	Ammoniacal tartrite.
Tartar antimoniated	—	—	Antimoniated tartrite of potash.
Tartar calcareous	————	—	Tartrite of lime.
Tartar chalybeated.	—	—	Ferruginous tartrite of potash.
Tartar cretaceous	————	—	Carbonate of potash.
Tartar crude	—	—	Tartar.
Tartar cupreous	—	—	Tartrite of copper.
Tartar emetic	————	—	Antimoniated tartrite of potash.
Tartar of magnesia	—	—	Tartrite of magnesia.
Tartar of potash	————	—	Tartrite of potash.
Tartar of soda	————	—	Tartrite of soda.
Tartar martial soluble	—	—	Ferruginous tartrite of potash.
Tartar mephitized	—	—	Carbonate of potash.
Tartar mercurial	—	—	Mercurial tartrite.
Tartar saturnine	————	—	Tartrite of lead.
Tartar sparry, or of spar	—	—	Fluate of potash.
Tartar soluble	—	—	Tartrite of potash.
Tartar stibiatisd	—	—	Antimoniated tartrite of potash.
Tartar tartarised, or terra fo-	}	}	Tartrite of potash.
liata tartari			
Tartar tartarised, holding an-	}	}	Tartrite of potash supercom-
timony in solution			
Tartar vitriolated.	—	—	Sulphate of potash.
Tincture acrid of tartar	—	—	Alcohol of potash.
Tinctures spirituous	—	—	Refinous alcohols.
Tin	—	—	Tin.
Tin muriated	—	—	Muriate of tin.
Tungstein	—	—	Tungstein, or Tungstein
Turbith mineral	————	{	Yellow oxide of mercury by the sulphuric acid.
Turbith nitrous	————		Yellow oxide of mercury by the nitric acid.

V.

Verdegris	—	—	Green oxide of copper.
Verdegris of the shops	—	{	Acetite of copper, with ex-
————— distilled	—		cess of oxide.
Venus	————	—	CrySTALLISED acetite of copper.
		—	Copper.

*Ancient Names.**New Names.*

Vinegar distilled	—	Acetous acid.
Vinegar of saturn	—	Acetite of lead.
Vinegar radical	— —	Acetic acid.
Vitriol ammoniacal	—	Ammoniacal sulphate.
Vitriol blue, or Roman vitriol		Sulphate of copper.
Vitriol green, or copperas	—	Sulphate of iron.
Vitriol magnesian	—	Sulphate of magnesia.
Vitriol martial	—	Sulphate of iron.
Vitriol of antimony	—	Sulphate of antimony.
Vitriol of clay, or argile	—	Sulphate of alumine.
Vitriol of bismuth	—	Sulphate of bismuth.
Vitriol of cobalt	— —	Sulphate of cobalt.
Vitriol of copper	—	Sulphate of copper.
Vitriol of cyprus	—	Sulphate of copper.
Vitriol of lead	— —	Sulphate of lead.
Vitriol of manganese	—	Sulphate of manganese.
Vitriol of mercury	—	Sulphate of mercury.
Vitriol of nickel	— —	Sulphate of nickel.
Vitriol of platina	—	Sulphate of platina.
Vitriol of potash	—	Sulphate of potash.
Vitriol of silver	— —	Sulphate of silver.
Vitriol of soda	—	Sulphate of soda.
Vitriol of tin	— —	Sulphate of tin.
Vitriol of zinc	— —	Sulphate of zinc.
Vitriol white	— —	Sulphate of zinc.

W.

Water	— —	Water.
Waters aerated, or acidulated		{ Water impregnated with carbonic acid.
Water mercurial	—	Solution of nitrate of mercury.
— hepatic	— —	{ Sulphurated or sulphureous waters.
Wolfram of Meff. d'Elhuyar		Tungstein.
Wool philosophical	—	Sublimed oxide of zinc.

Z.

Zinc	— —	Zinc.
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A

D I C T I O N A R Y

OF THE

NEW CHEMICAL NOMENCLATURE.

A.

New Names.

Ancient Names.

A CETATES,
Acetas, tis, f. m.

{ Salts formed by the union
of the acetic acid, or ra-
dical vinegar, with different
bases.

Acetate aluminous, or
Acetate of alumine.

Acetas aluminosus.

Acetate ammoniacal, or
Acetate of ammoniac *.

Acetas ammoniacalis.

Acetate of arsenic,
Acetas arsenici.

Acetate of barytes,
Acetas barytæ.

* We shall not again repeat these two manners of expressing the basis of a neutral salt, but shall use the one or the other without distinction. These first examples are sufficient to shew, that either the substantive or the adjective may be used at pleasure.

This observation applies equally to the Latin nomenclature.

*New Names.**Ancient Names.*

Acetate of bismuth,	
Acetas bismuthi.	
Acetate of cobalt,	
Acetas cobalti.	
Acetate of copper,	
Acetas cupri.	
Acetate of gold,	
Acetas auri.	
Acetate of iron,	
Acetas ferri.	
Acetate of lead,	
Acetas plumbi.	
Acetate of lime,	
Acetas calcareus.	
Acetate of magnesia,	
Acetas magnesiae.	
Acetate of manganese,	
Acetas magnesi.	
Acetate of mercury,	
Acetas hydrargiri.	
Acetate of molybdena,	
Acetas molybdeni.	
Acetate of nickel,	
Acetas niccoli.	
Acetate of platina,	
Acetas platini.	
Acetate of potash,	
Acetas potassae.	
Acetate of silver,	
Acetas argenti.	
Acetate of soda,	
Acetas sodae.	
Acetate of tin,	
Acetas stanni.	
Acetate of tungsten,	
Acetas tungsteni.	
Acetate of zinc,	
Acetas zinci.	

Acetites,
Acetis, itis, f. m.

Acetite aluminous,
Acetis aluminosus.

{ Salts formed by the union of
the acetous acid, or distilled
vinegar, with different
bases.

} Acetated clay.

Acetite

New Names.

Ancient Names.

Acetite ammoniacal, Acetis ammoniacalis.	}	Ammoniacal acetous salt.
Acetite of antimony, Acetis stibii.		Spirit of Mindererus.
Acetite of arsenic, Acetis arsenicalis.	}	The fuming arsenico-acetous li- quor of Mr. Cadet.
Acetite of barytes, Acetis baryticus.		
Acetite of bismuth, Acetis bismuthi.		
Acetite of cobalt, Acetis cobalti.		
Acetite of copper, Acetis cupri.	{	Acetous salt of copper, ver- degris.
Acetite of gold, Acetis auri.		Crystals of venus, or distilled verdegris.
Acetite of iron, Acetis ferri.	}	Martial acetous salt.
Acetite of lead, Acetis plumbi.		Acetous salt of lead. Vinegar of saturn. Salt or sugar of lead.
Acetite of lime, Acetis calcareus.	}	Acetous calcareous salt.
Acetite of magnesia, Acetis magnesiæ.		Acetous salt of magnesia.
Acetite of manganese, Acetis magnesi.		
Acetite of mercury, Acetis hydrargiri.	}	Mercurial terra foliata.
Acetite of molybdena, Acetis molybdeni.		
Acetite of nickel Acetis niccoli.		
Acetite of platina, Acetis platini.		
Acetite of potash, Acetis potassæ, vel po- tasseus.	{	Terra foliata tartari.
Acetite of silver, Acetis argenti.		
Acetite of soda, Acetis sodæ, vel sodaceus.	}	Acetous mineral salts.
		Mineral terra foliata.

Acetite

*New Names.**Ancient Names.*

Acetite of tin, Acetis stanni.	
Acetite of tunstien, Acetis tunstieni.	
Acetite of zinc, Acetis zinci.	}
Acid acetic, Acidum aceticum.	}
Acid acetous, Acidum acetosum.	}
Acid arsenic, Acidum arsenicum.	}
Acid benzoic, Acidum benzoicum.	}
Acid benzoic sublimed, Acidum benzoicum sublimatum.	}
Acid bombic, Acidum bombicum.	}
Acid boracic, Acidum boracicum.	}
Acid carbonic, Acidum carbonicum.	}
Acid citric, Acidum citricum.	}
Acid fluoric, Acidum fluoricum.	}
Acid formic, Acidum formicum.	}
Acid gallic, Acidum gallæ, seu gal- laceum.	}
Acid lactic, Acidum lacticum.	}
Acid lithic, Acidum lithicum.	}
Acid malic, Acidum malicum.	}

Acetous salt of zinc.

Radical vinegar.

Spirit of venus.

Acetous acid.

Distilled vinegar.

Arsenical acid.

Acid of benjamin or benzoin.

Flowers of benzoin.

Volatile salt of benzoin.

Acid of silk-worms.

Volatile narcotic salt of vitriol.

Sedative salt, acid of borax.

Gas sylvestre, of VanHelmont.

Spiritus sylvestris.

Fixed air, of Dr. Black.

Aerial acid.

Atmospheric acid.

Mephitic acid.

Cretaceous acid.

Acid of charcoal.

Lemon juice.

Fluoric acid.

Acid of spar.

Formic acid, acid of ants.

Astringent principle.

Gallic acid.

Sour milk, galactic acid.

Acid of bezoar.

Lithiasic acid.

Acid of apples.

Malusian acid.

Acid

*New Names.**Ancient Names.*

Acid molybdic, <i>Acidum molybdicum.</i>	}	Acid of molybdena.
Acid muriatic, <i>Acidum muriaticum.</i>		Acid of wolfram.
Acid muriatic oxygenated, <i>Acidum muriaticum ox-</i> <i>igenatum.</i>	}	Fuming spirit of salt.
		Marine acid.
Acid nitrous, <i>Acidum nitrosum.</i>	}	Dephlogisticated marine acid.
		Aerated marine acid.
Acid nitric, <i>Acidum nitricum.</i>	}	{ Phlogisticated nitrous acid.
		{ Fuming nitrous acid.
Acid nitro-muriatic, <i>Acidum nitro-muriaticum.</i>	}	{ Fuming spirit of nitre.
		Pale nitrous acid.
Acid oxalic, <i>Acidum oxalicum.</i>	}	Dephlogisticated nitrous acid.
		Aqua regia.
Acid phosphoreous, <i>Acidum phosphorosum.</i>	}	Regaline acid.
Acid phosphoric, <i>Acidum phosphoricum.</i>		{ Acid of forrel.
Acid Prussic, <i>Acidum Prussicum.</i>	}	{ Saccharine acid.
		{ Acid of sugar.
Acid pyroligneous, <i>Acidum pyrolignosum.</i>	}	Volatile phosphoric acid.
Acid pyromucous, <i>Acidum pyromucosum.</i>		Acid of phosphorus.
Acid pyrotartareous, <i>Acidum pyrotartarosum.</i>	}	Acid of urine.
		Colouring matter of Prussian blue.
Acid saccholaetic, <i>Acidum saccholaeticum.</i>	}	Empyreumatic acid, spirit of wood.
Acid sebacic, <i>Acidum sebaticum.</i>		Spirit of honey, of sugar, &c.
Acid succinic, <i>Acidum succinicum.</i>	}	Syrupous acid.
		Spirit of tartar.
Acid sulphureous, <i>Acidum sulphurosusum.</i>	}	Acid of the sugar of milk.
		Acid of fat.
Acid sulphuric, <i>Acidum sulphuricum.</i>	}	Volatile salt of amber.
		Acid of amber.
	}	{ Sulphureous acid.
		{ Volatile sulphureous acid.
	}	{ Phlogisticated vitriolic acid.
		{ Spirit of sulphur.
	}	{ Acid of sulphur.
		{ Vitriolic acid.
	}	{ Oil of vitriol.
		{ Spirit of vitriol.

Acid

*New Names.**Ancient Names.*

Acid tartareous, Acidum tartarofum.	}	Tartareous acid.
Acid tunstic, Acidum tunsticum.		Acid of tartar.
Affinity. Affinitas.	}	Acid of tungstein,
		Acid of wolfram.
Aggregation. Aggregatio.	}	Affinity.
Air atmospheric. Aër atmosphæricus.		Aggregation.
Alkalis, Alkalia.	}	Atmospherical air.
Alcohol, Alcohol, indecl.		Alkalis in general.
Alcohol of potash, Alcohol potassæ.	}	Spirit of wine.
Alcohol nitric, Alcohol nitricum.		Ardent spirits.
Alcohol resinous, Alcohol resinofum.	}	Lily of Paracelsus,
Alloy or allay, Connubium metallicum		Acrid tincture of tartar.
		Dulcified spirit of nitre.
		Spirituous tincture.
		Alloy of metals.
Alumine, Alumina.	{	Earth of alum.
		Basis of alum.
		Pure argillaceous earth.
Amalgam.		Amalgam.
Ammoniac, Ammoniaca.	{	Volatile alkali caustic.
		Fluor volatile alkali.
		Volatile spirit of salammoniac.
Antimony, Antimonium, stibium.	}	Regulus of antimony.
Argile, or clay, a mixture of alumine and filice, Argilla.		Clay.
Aroma, Aroma.	}	Spiritus rector.
Arfeniate, Arfenias, tis, s. m.		Odoriferous principle of flowers.
Arfeniate acidulous of potash, Arfenias acidulus potassæ.	}	Arfenical salts.
Arfeniate of alumine, Arfenias aluminæ.		Arfenical neutral salt of Macquer.
Arfeniate of ammoniac, Arfenias ammoniacæ seu ammoniacalis.	}	Arfenical ammoniac.
		Arfeniate

*New Names.**Ancient Names.*

Arseniate of barytes,
 Arsenias barytæ.
 Arseniate of bismuth,
 Arsenias bismuthi.
 Arseniate of cobalt,
 Arsenias cobalti.
 Arseniate of copper,
 Arsenias cupri.
 Arseniate of gold,
 Arsenias auri.
 Arseniate of iron,
 Arsenias ferri.
 Arseniate of lime,
 Arsenias calcis.
 Arseniate of magnesia,
 Arsenias magnesiæ.
 Arseniate of manganese,
 Arsenias magnesii.
 Arseniate of mercury,
 Arsenias hydrargiri.
 Arseniate of molybdena,
 Arsenias molybdeni.
 Arseniate of nickel,
 Arsenias niccoli.
 Arseniate of platina,
 Arsenias platini.
 Arseniate of potash,
 Arsenias potassæ.
 Arseniate of silver,
 Arsenias argenti.
 Arseniate of soda,
 Arsenias sodæ.
 Arseniate of tin,
 Arsenias stanni.
 Arseniate of tunstein,
 Arsenias tunsteni.
 Arseniate of zinc,
 Arsenias zinci.
 Azote.

Base of atmospherical mephitis.

B.

Barytes,
 Baryta.

{ Ponderous earth.
 Barytes.
 Basis of ponderous spar.
 Bassams,

*New Names.**Ancient Names.*

Balfams,
Balsama.

Benzoin,
Benzoe.

Benzoates,
Benzoas, tis, f. m.

Benzoate of alumine,
Benzoas aluminofus.
Benzoate of ammoniac,
Benzoas ammoniacalis.
Benzoate of antimony,
Benzoas stibii.
Benzoate of arsenic,
Benzoas arsenicalis.
Benzoate of barytes,
Benzoas baryticus.
Benzoate of bismuth,
Benzoas bismuthi.
Benzoate of cobalt,
Benzoas cobalti.
Benzoate of copper,
Benzoas cupri.
Benzoate of gold,
Benzoas auri.
Benzoate of iron,
Benzoas ferri.
Benzoate of lead,
Benzoas plumbi.
Benzoate of lime,
Benzoas calcareus.
Benzoate of magnesia,
Benzoas magnesiæ.
Benzoate of manganese,
Benzoas magnesii.
Benzoate of mercury,
Benzoas hydrargiri.
Benzoate of molybdena,
Benzoas molybdeni.

{ Balfams of Bucquet (resins
united with a concrete acid
salt).

} Benzoin or benjamin.

{ Salts formed by the union of
the benzoic acid with dif-
ferent bases.

{ The salts of this genus have
no appellations in the an-
cient nomenclature.

New Names.

Ancient Names.

Benzoate of nickel,
Benzoas niccoli.
Benzoate of platina,
Benzoas platini.
Benzoate of potash,
Benzoas potassæ.
Benzoate of silver,
Benzoas argenti.
Benzoate of soda,
Benzoas sodæ.
Benzoate of tin,
Benzoas stanni.
Benzoate of tunstein,
Benzoas tunsteni.
Benzoate of zinc,
Benzoas zinci.

Bismuth
Bismuthum.

Bitumens,
Bitumina.

} Bismuth.

} Bitumens.

Bombiate,
Bombias, tis, f. m.

{ Salt formed by the union of
the bombic acid with dif-
ferent bases.
This genus of salts had no
appellation in the ancient
nomenclature.

Bombiate of alumine,
Bombias aluminofus.
Bombiate of ammoniac,
Bombias ammoniacalis.
Bombiate of antimony,
Bombias stibii.
Bombiate of arsenic,
Bombias arsenicalis.
Bombiate of barytes,
Bombias baryticus.
Bombiate of bismuth,
Bombias bismuthi.
Bombiate of cobalt,
Bombias cobalti.
Bombiate of copper,
Bombias cupri.
Bombiate of gold,
Bombias auri.

Bombiate

*New Names.**Ancient Names.*

Bombiate of lead,
 Bombias plumbi.
 Bombiate of iron,
 Bombias ferri.
 Bombiate of lime,
 Bombias calcareus.
 Bombiate of magnesia,
 Bombias magnesiæ.
 Bombiate of manganese.
 Bombias magnesiæ.
 Bombiate of mercury,
 Bombias hydrargiri.
 Bombiate of molybdena,
 Bombias molybdeni.
 Bombiate of nickel,
 Bombias niccoli.
 Bombiate of platina,
 Bombias platini.
 Bombiate of potash,
 Bombias potassæ.
 Bombiate of silver,
 Bombias argenti.
 Bombiate of soda,
 Bombias sodæ.
 Bombiate of tin,
 Bombias stanni.
 Bombiate of tunstein,
 Bombias tunsteni.
 Bombiate of zinc.
 Bombias zinci.
 Borate,
 Boras, tis, f. m.
 Borate aluminous,
 Boras aluminosus.
 Borate ammoniacal,
 Boras ammoniacalis.
 Borate of antimony,
 Boras stibii.
 Borate of arsenic,
 Boras arsenici.
 Borate of barytes,
 Boras barytæ.
 Borate of bismuth,
 Boras bismuthi.

} Borax.
 } Argillaceous borax.
 } Ammoniacal borax.
 } Sedative sal ammoniac.
 } Borax of antimony.
 } Ponderous or barytic borax.

New Names.

Ancient Names.

Borate of cobalt, Boras cobalti.	}	Borax of cobalt.
Borate of copper, Boras cupri.		Borax of copper.
Borate of gold, Boras auri.	}	Borax of iron.
Borate of iron, Boras ferri.		
Borate of lead, Boras plumbi.		
Borate of lime, Boras calcis.	}	Magnesian borax.
Borate of magnesia, Boras magnesiæ.		
Borate of manganese, Boras magnesi.		
Borate of mercury, Boras mercurii.	}	Mercurial borax.
Borate of molybdena, Boras molybdeni.		Mercurial sedative salt.
Borate of nickel, Boras niccoli.	}	Vegetable borax.
Borate of platina, Boras platini.		
Borate of potash, Boras potassæ.		
Borate of silver, Boras argenti.	}	Common borax saturated with the acid of borax.
Borate of soda, Boras sodæ.		
Borate of tin, Boras stanni.		
Borate of tungstein, Boras tungsteni.	}	Borax of zinc.
Borate of zinc, Boras zinci.		
Borax of soda, or borate su- persaturated with soda.	}	Crude borax,
		Tincal.
		Chryfocalla.
		Borax of commerce.

C.

*New Names.**Ancient Names.*

Caloric,
Caloricum.

Camphor,
Camphora.

Camphorate,
Camphoras, tis, f. m.

Camphorate of alumine,
Camphoras aluminosus.
Camphorate of ammoniac,
Camphoras ammoniacalis.

Camphorate of antimony,
Camphoras stibii.

Camphorate of arsenic,
Camphoras arsenicalis.

Camphorate of barytes,
Camphoras baryticus.

Camphorate of bismuth,
Camphoras bismuthi.

Camphorate of cobalt,
Camphoras cobalti.

Camphorate of copper,
Camphoras cupri.

Camphorate of gold,
Camphoras auri.

Camphorate of iron,
Camphoras ferri.

Camphorate of lead,
Camphoras plumbi.

Camphorate of lime,
Camphoras calcis.

Camphorate of magnesia,
Camphoras magnesiæ.

Camphorate of manganese,
Camphoras magnesi.

Camphorate of mercury,
Camphoras hydrargiri.

{ Latent heat.
Fixed heat.
Matter of heat.

{ Camphor.

{ Salt formed by the union of
the camphoric acid with
different bases.

{ These salts were unknown
to former chemists, and
have no names in the an-
cient nomenclature.

New Names.

Ancient Names.

Camphorate of molybdena,
Camphoras molybdeni.

Camphorate of nickel,
Camphoras niccoli.

Camphorate of platina,
Camphoras platini.

Camphorate of potash,
Camphoras potassæ.

Camphorate of silver,
Camphoras argenti.

Camphorate of soda,
Camphoras sodæ.

Camphorate of tin,
Camphoras stanni.

Camphorate of tunstein,
Camphoras tunsteni.

Camphorate of zinc,
Camphoras zinci.

Carbone,
Carbonicum.

Carbonate,
Carbonas, tis. f. m.

Carbonate of alumine,
Carbonas aluminosus.

Carbonate of ammoniac,
Carbonas ammoniaci.

Carbonate of antimony,
Carbonas antimonii.

Carbonate of arsenic,
Carbonas arsenicalis.

Carbonate of barytes,
Carbonas baryticus.

Carbonate of bismuth,
Carbonas bismuthi.

Carbonate of cobalt,
Carbonas cobalti.

Carbonate of copper,
Carbonas cupri.

Carbonate of gold,
Carbonas auri.

} Pure charcoal.

} Salt formed by the union of
the carbonic acid with bases.

} Concrete volatile alkali.
Ammoniacal chalk.

{ Barytic or ponderous chalk.
Aerated ponderous earth.
Effervescent barytes.
Mephitized barytes.

*New Names.**Ancient Names.*

Carbonate of iron,
Carbonas ferri.

Carbonate of lead,
Carbonas plumbi.

Carbonate of lime,
Carbonas calcis.

Carbonate of magnesia,
Carbonas magnesiæ.

Carbonate of manganese,
Carbonas magnesi.

Carbonate of mercury,
Carbonas mercurii.

Carbonate of molybdena,
Carbonas molybdeni.

Carbonate of nickel,
Carbonas niccoli.

Carbonate of platina,
Carbonas platini.

Carbonate of potash,
Carbonas potassæ.

Carbonate of silver,
Carbonas argenti.

{ Aperitive saffron of mars.
Rust of iron.
Aerated iron.
Martial chalk.
Mephitized iron.
Chalk of lead.
Spathose lead ore.
Chalk.
Limestone.
Aerated, or effervescent, cal-
careous earth.
Calcareous spar.
Cream of lime.
Magnesian earth.
Magnesia alba.
Aerated magnesia of Berg-
man.
Cretaceous magnesia.
Magnesian chalk.
Muriatic earth of Kirwan.
Count Palma's powder.
Powder of Sentinelli.

{ Fixed salt of tartar.
Vegetable fixed alkali.
Aerated vegetable fixed al-
kali.
Cretaceous tartar.
Mephitized potash.
Nitre fixed by itself.
Alkahest of Van Helmont.

Carbonate

New Names.

Ancient Names.

Carbonate of soda,
Carbonas sodæ.

Carbonate of tin,
Carbonas stanni.
Carbonate of tunstein,
Carbonas tunsteni.
Carbonate of zinc,
Carbonas zinci.
Carbure of iron.

Citrate
Citras, tis. f. m.

Citrate of alumine,
Citras aluminofus.
Citrate of ammoniac,
Citras ammoniaci.
Citrate of antimony,
Citras stibii.
Citrate of arsenic,
Citras arsenicalis.
Citrate of barytes,
Citras baryticus.
Citrate of bismuth,
Citras bismuthi.
Citrate of cobalt,
Citras cobalti.
Citrate of copper,
Citras cupri.
Citrate of gold,
Citras auri.
Citrate of iron,
Citras ferri.
Citrate of lead,
Citras plumbi.

{ Natrum, or natron.
Base of marine salt.
Marine or mineral alkali.
Crystals of soda.
Cretaceous soda.
Aerated effervescent, or soda.
Mephitized soda.

{ Chalk of zinc.
Aerated zinc.
Plumbago.
Salt formed by the union of
the acid of lemons with
different bases.
This genus of salts had no
name in the ancient no-
menclature.

*New Names.**Ancient Names.*

Citrate of lime,
 Citras calcareus.
 Citrate of magnesia,
 Citras magnesiæ.
 Citrate of manganese,
 Citras magnesiæ.
 Citrate of mercury,
 Citras mercurii.
 Citrate of molybdena,
 Citras molybdeni.
 Citrate of nickel,
 Citras niccoli.
 Citrate of platina,
 Citras platini.
 Citrate of potash,
 Citras potassæ.
 Citrate of silver,
 Citras argenti.
 Citrate of soda,
 Citras sodæ.
 Citrate of tin,
 Citras stanni.
 Citrate of tunstien,
 Citras tunstieni.
 Citrate of zinc.
 Citras zinci.

Cobalt.

Copper,

Cuprum.

{ Regulus of cobalt.
 { Cobalt.
 { Copper.
 { Venus.

D.

Diamond.

Diamond.

E.

Ether acetic,

Ether aceticum.

Ether muriatic,

Ether muriaticum.

{ Acetous ether, or æther.
 { Marine ether.

Ether

New Names.

Ancient Names.

Ether nitric, Ether nitricum.	}	Nitrous ether.
Ether sulphuric, Ether sulphuricum.		
Extract, Extractum.	}	Extract.

F.

Fecula, Fecula.	}	Fecula of vegetables.
Fluate, Fluas, tis. f. m.		
Fluate of alumine, Fluas aluminæ.	}	Salt formed by the fluoric acid, combined with different bases.
Fluate of ammoniac, Fluas ammoniacalis.		
Fluate of antimony, Fluas stibii.	}	Argillaceous fluor.
Fluate of arsenic, Fluas arsenicalis.		
Fluate of barytes, Fluas barytæ.	}	Sparry sal ammoniac.
Fluate of bismuth, Fluas bismuthi.		
Fluate of cobalt, Fluas cobalti.	}	Ammoniacal fluor.
Fluate of copper, Fluas cupri.		
Fluate of gold, Fluas auri.	}	Ponderous fluor.
Fluate of iron, Fluas ferri.		
Fluate of lead, Fluas plumbi.	}	Barytic fluor.
Fluate of lime, Fluas calcareus.		
	{	Fluor spar.
		Vitreous spar.
		Cubic spar.
		Phosphoric spar.
	{	Sparry fluor.

*New Names.**Ancient Names.*

Fluate of magnesia, Fluas magnesiæ.	} Fluorated magnesia, Magnesian fluor.
Fluate of manganese, Fluas magnesi.	
Fluate of mercury, Fluas mercurii.	
Fluate of molybdena, Fluas molybdeni.	
Fluate of nickel, Fluas niccoli.	
Fluate platina, Fluas platini.	
Fluate of potash, Fluas potassæ.	} Tartareous fluor.
Fluate of silver, Fluas argenti.	
Fluate of soda, Fluas sodæ.	} Fluor of soda.
Fluate of tin, Fluas stanni.	
Fluate of tunstein, Fluas tunsteni.	
Fluate of zinc, Fluas zinci.	
Formiate, Formias, tis. f. m.	} Salt produced by the union of the formic acid with different bases. This genus of salt was with- out a name in the ancient nomenclature.
Formiate of alumine, Formias aluminosus.	
Formiate of ammoniac, Formias ammoniacalis.	
Formiate of antimony, Formias antimonii.	
Formiate of arsenic, Formias arsenicalis.	
Formiate of barytes, Formias baryticus.	
Formiate of bismuth, Formias bismuthi.	
Formiate of cobalt, Formias cobalti.	

Formiate

*New Names.**Ancient Names.*

Formiate of copper,
 Formias cupri.
 Formiate of gold,
 Formias auri.
 Formiate of iron,
 Formias ferri.
 Formiate of lead,
 Formias plumbi.
 Formiate of lime,
 Formias calcareus.
 Formiate of magnesia.
 Formias magnesiz.
 Formiate of manganese,
 Formias magnesi.
 Formiate of mercury,
 Formias mercurii.
 Formiate of molybdena,
 Formias molybdeni.
 Formiate of nickel,
 Formias niccoli.
 Formiate of platina,
 Formias platini.
 Formiate of silver,
 Formias argenti.
 Formiate of soda,
 Formias sodæ.
 Formiate of tin,
 Formias stanni.
 Formiate of tungsten,
 Formias tungsteni.
 Formiate of zinc,
 Formias zinci.

G.

Gas,

Gas.

Gas, acetous acid,

Gas acidum acetosum.

Gas ammoniacal,

Gas ammoniacale.

{	Gas.
	Elastic fluid.
	Aeriform fluid.
{	Acetous acid gas.
	Alkaline gas.
	Alkaline air.
	Volatile alkali gas.

Gas

*New Names.**Ancient Names.*

Gas azotic, Gas azoticum.	{ Vitiated air. Impure air. Phlogisticated air. Phlogisticated gas. Atmospheric mephitic.
Gas, carbonic acid, Gas acidum carbonicum.	{ Fixed air. Solid air, of Hales. Cretaceous acid gas. Mephitic gas. Aerial acid.
Gas, carbonated hydrogenous, Gas hydrogenium carbonatum.	{ Inflammable gas with charcoal.
Gas, fluoric acid, Gas acidum fluoricum.	{ Sparry acid gas. Fluor acid gas.
Gas hydrogenous, Gas hydrogenium.	{ Inflammable air. Inflammable gas. The phlogiston of Kirwan.
Gas hydrogenous of marshes, Gas hydrogenium paludum.	{ Mephitized inflammable gas. Inflammable air of marshes.
Gas, muriatic acid, Gas acidum muriaticum.	{ Marine air or gas, of Dr. Priestley. Muriatic acid gas.
Gas nitrous, Gas nitrosum.	{ Nitrous gas.
Gas, nitrous acid, Gas acidum nitrosum.	{ Nitrous acid gas.
Oxygenous gas, Gas oxigenium.	{ Vital air. Pure air. Dephlogisticated air.
Gas, oxygenated muriatic acid, Gas acidum muriaticum oxigenatum.	{ Aerated muriatic acid gas. Dephlogisticated marine acid.
Gas, Prussic acid, Gas acidum Prussicum.	{ Gas Prussian.
Gas, phosphorised hydrogenous, Gas hydrogenium phosphorifatum.	{ Phosphoric gas.

Gas,

*New Names.**Ancient Names.*

Gas, sulphurated hydroge- nous,	}	Hepatic gas.
Gas hydrogenium ful- phuratum.		
Gas, sulphureous acid.	}	Sulphureous acid gas.
Gas acidum sulphureum.		
Gluten,	}	Glutinous matter of flour.
Gluten.		
Gold,	}	Gold.
Aurum.		

I.

Iron.	}	Iron.
Ferrum.		

L.

Lactates,
Lactas, tis, f, m.

{ Salts formed by the union of
the acid of sour whey, or
the lactic acid, with diffe-
rent bases.
These salts were unknown be-
fore the time of Scheele,
and have not been hitherto
named. Their properties
have been very little exa-
mined.

Lactate of alumine,
Lactas aluminosus.
Lactate of ammoniac,
Lactas ammoniacalis.
Lactate of antimony.
Lactas stibii.
Lactate of arsenic,
Lactas arsenicalis.
Lactate of barytes,
Lactas barytæ.
Lactate of bismuth,
Lactas bismuthi.
Lactate of cobalt,
Lactas cobalti.
Lactate of copper,
Lactas cupri.

*New Names.**Ancient Names.*

Lactate of gold,
 Lactas auri.
 Lactate of lead,
 Lactas plumbi.
 Lactate of lime,
 Lactas calcareus.
 Lactate of iron,
 Lactas ferri.
 Lactate of magnesia,
 Lactas magnesiæ.
 Lactate of manganese,
 Lactas magnesi.
 Lactate of mercury,
 Lactas mercurii.
 Lactate of molybdena,
 Lactas molybdeni.
 Lactate of nickel,
 Lactas niccoli.
 Lactate of platina,
 Lactas platini.
 Lactate of potash,
 Lactas potassæ.
 Lactate of silver,
 Lactas argenti.
 Lactate of soda,
 Lactas sodæ.
 Lactate of tin,
 Lactas stanni.
 Lactate of tunstein,
 Lactas tunsteni.
 Lactate of zinc,
 Lactas zinci.
 Lead,
 Plumbum.
 Light.
 Lime, or calcareous earth.

Lithiates,
 Lithias, tis, f. m.

} Lead.
 } Saturn.
 } Light.
 } Calcareous earth.
 } Quicklime.
 } Salts formed by the combination of the lithic acid, or acid of the stone of the bladder, with different bases.
 } This genus of salts had no name in the ancient nomenclature, because it was not known before the time of Scheele.

Lithiate

*New Names.**Ancient Names.*

Lithiate of alumine,
Lithias aluminosus.

Lithiate of ammoniac,
Lithias ammoniacalis.

Lithiate of antimony,
Lithias stibii.

Lithiate of arsenic,
Lithias arsenicalis.

Lithiate of barytes,
Lithias baryticus.

Lithiate of bismuth,
Lithias bismuthi.

Lithiate of cobalt,
Lithias cobalti.

Lithiate of copper,
Lithias cupri.

Lithiate of gold,
Lithias auri.

Lithiate of iron,
Lithias ferri.

Lithiate of lead,
Lithias plumbi.

Lithiate of lime,
Lithias calcareus.

Lithiate of magnesia,
Lithias magnesiæ.

Lithiate of manganese,
Lithias magnesiæ.

Lithiate of mercury,
Lithias mercurii.

Lithiate of molybdena,
Lithias molybdeni.

Lithiate of nickel,
Lithias niccoli.

Lithiate of platina,
Lithias platini.

Lithiate of potash,
Lithias potassæ.

Lithiate of silver,
Lithias argenti.

Lithiate of soda,
Lithias sodæ.

Lithiate of tin,
Lithias stanni.

*New Names.**Ancient Names.*

Lithiate of tunstein,
Lithias tunsteni.

Lithiate of zinc,
Lithias zinci.

M.

Malates,
Malas, tis, f. m.

{ Salts formed by the union of
the malic acid, or acid of
apples, with different bases.
This genus of salts has not yet
been named in the ancient
nomenclature.

Malate of alumine,
Malas aluminosus.

Malate of ammoniac,
Malas ammoniacalis.

Malate of antimony,
Malas stibii.

Malate of arsenic,
Malas arsenicalis.

Malate of barytes,
Malas baryticus.

Malate of bismuth,
Malas bismuthi.

Malate of cobalt,
Malas cobalti.

Malate of copper,
Malas cupri.

Malate of gold,
Malas auri.

Malate of lead,
Malas plumbi.

Malate of lime,
Malas calcareus.

Malate of iron,
Malas ferri.

Malate of magnesia,
Malas magnesiæ.

Malate of manganese,
Malas magnesii.

Malate of mercury,
Malas mercurii.

Malate of molybdena,
Malas molybdeni.

*New Names.**Ancient Names.*

Malate of nickel,
Malas niccoli.

Malate of platina,
Malas platini.

Malate of potash,
Malas potassæ.

Malate of silver,
Malas argenti.

Malate of soda,
Malas sodæ.

Malate of tin,
Malas stanni.

Malate of tunstein,
Malas tunsteni.

Malate of zinc,
Malas zinci.

Manganese,
Magnesium.

Mercury,
Hydrargirum.

Molybdates,
Molybdas, tis, f. m.

Molybdate of alumine,
Molybdas aluminosus.

Molybdate of ammoniac,
Molybdas ammoniacalis.

Molybdate of antimony,
Molybdas stibii.

Molybdate of arsenic,
Molybdas arsenicalis.

Molybdate of barytes,
Molybdas baryticus.

Molybdate of bismuth,
Molybdas bismuthi.

Molybdate of cobalt,
Molybdas cobalti.

Molybdate of copper,
Molybdas cupri.

Molybdate of gold,
Molybdas auri.

} Regulus of manganese.

} Mercury.

} Quicksilver.

} Salts formed by the union of
the molybdic acid with
different bases.

} This genus of salts was with-
out a name in the ancient
nomenclature.

*New Names.**Ancient Names.*

Molybdate of iron,
 Molybdas ferri.
 Molybdate of lead,
 Molybdas plumbi.
 Molybdate of lime,
 Molybdas calcareus.
 Molybdate of magnesia,
 Molybdas magnesiæ.
 Molybdate of manganese,
 Molybdas magnesiæ.
 Molybdate of mercury,
 Molybdas mercurii.
 Molybdate of nickel,
 Molybdas niccoli.
 Molybdate of platina,
 Molybdas platini.
 Molybdate of potash,
 Molybdas potassæ.
 Molybdate of silver,
 Molybdas argenti.
 Molybdate of soda,
 Molybdas sodæ.
 Molybdate of tin,
 Molybdas stanni.
 Molybdate of tungsten,
 Molybdas tungsteni.
 Molybdate of zinc,
 Molybdas zinci.
 Molybdena.
 Mucus.
 Muriates,
 Murias, tis, f. m.
 Muriate of alumine,
 Murias aluminosus.
 Muriate of ammoniac,
 Murias ammoniacalis.
 Muriate of antimony,
 Murias stibii.
 Muriate of antimony, fuming,
 Murias stibii, fumans.
 Muriate of arsenic,
 Murias arsenicalis.

Regulus of molybdena.

Mucilage.

Salts formed by the union of
 the muriatic acid with dif-
 ferent bases.

Marine alum.

Argillaceous marine salt.

Sal ammoniac.

Salmiac.

Muriated antimony.

Butter of antimony.

Muriate

*New Names.**Ancient Names.*

Muriate of arsenic sublimed, Murias arsenicalis sublimatus.	}	Butter of arsenic.
Muriate of barytes, Murias baryticus.		Barytic marine salt.
Muriate of bismuth, Murias bismuthi.	}	Muriate of bismuth.
Muriate of bismuth sublimed Murias bismuthi sublimatus.		Butter of bismuth.
Muriate of cobalt, Murias cobalti.	}	Sympathetic ink.
Muriate of copper, Murias cupri.		Muriated copper.
Muriate of copper sublimed, ammoniacal, Murias cupri ammoniacalis sublimatus.	}	Cupreous ammoniacal flowers.
Muriate of gold, Murias auri.		Regaline salt of gold. Muriated gold.
Muriate of iron, Murias ferri.	}	Muriated iron. Marine salt of iron.
Muriate of lead, Murias plumbi.		Muriated lead. Plumbum corneum.
Muriate of iron sublimed, ammoniacal.	}	Martial ammoniacal flowers.
Muriate of lime, Murias calcareus.		Mother water of sea-salt. Calcareous marine salt. Fixed sal ammoniac.
Muriate of magnesia, Murias calcareus.	}	Marine salt with base of magnesia.
Muriate of manganese, Murias magnesi.		Muriated manganese.
Muriate of mercury, corrosive Muriashydrargyri corrosivus.	}	Corrosive sublimate.
Muriate of mercury, mild, Muriashydrargyridulcis.		Mercurius dulcis.
Muriate of mercury sublimed, mild, Murias hydrargyri sublimatus.	}	Aquila alba.
Muriate of mercury and ammoniac, Murias hydrargyri et ammoniacalis.		Sal alembroth.

*New Names.**Ancient Names.*

Muriate of mercury by precipitation, Murias hydrargyri præcipitatus.	}	White precipitate.
		Mercurial muriate.
Muriate of molybdena, Murias molybdeni.		
Muriate of nickel, Murias niccoli.		
Muriate of platina, Murias platini.	}	Muriated platina.
Muriate of potash, Murias potassæ.		Regaline salt of platina.
		Febrifuge salt of Sylvius.
Muriate of silver, Murias argenti.		Luna cornea.
Muriate of soda, Murias sodæ.	}	Sea salt.
Muriate of soda fossile, Murias sodæ fossilis.		Sal gem.
Muriate of tin, Murias stanni.		Salt of jupiter.
Muriate of tin concrete, Murias stanni concretus.	}	Solid butter of tin, of Baumé.
Muriate of tin fuming, Murias stanni fumans.		Corneous tin.
Muriate of tin sublimed, Murias stanni sublinatus.	}	Fuming liquor of Libavius.
		Butter of tin.
Muriate of tunstein, Murias tunsteni.		
Muriate of zinc, Murias zinci.	}	Marine salt of zinc.
Muriate of zinc sublimed, Murias zinci.		Muriated zinc.
	}	Butter of zinc.
		New combinations of the oxygenated muriatic acid with potash and soda, discovered by Mr. Berthollett.
Muriates oxygenated.		
Muriate of potash oxygenated, Murias oxygenatus potassæ.		
Muriate of soda oxygenated, Murias oxygenatus sodæ.		

N.

*New Names.**Ancient Names.*

Nitrates, Nitras, tis, f. m.	{	Salts formed by the combination of the nitric acid with differ- ent bases.
Nitrate of alumine, Nitras aluminofus.		Nitrous alum.
Nitrate of ammoniac, Nitras ammoniacalis.		Argillaceous nitre.
Nitrate of antimony, Nitras stibii.		Nitrous sal ammoniac.
Nitrate of arsenic, Nitras arsenicalis.	{	Ammoniacal nitre.
Nitrate of barytes, Nitras baryticus.		Nitre of arsenic.
Nitrate of bismuth, Nitras bismuthi.	{	Nitrated barytes.
Nitrate of cobalt, Nitras cobalti.		Nitre of ponderous earth.
Nitrate of copper, Nitras cupri.	{	Nitre of bismuth.
Nitrate of gold, Nitras auri.		Nitre of cobalt.
Nitrate of iron, Nitras ferri.	{	Nitre of copper.
Nitrate of lead, Nitras plumbi.		Nitre of iron.
Nitrate of lime, Nitras calcareus.	{	Martial nitre.
Nitrate of magnesia, Nitras magnesiæ.		Nitre of lead.
Nitrate of manganese, Nitras magnesii.	{	Nitre of saturn.
Nitrate of mercury, Nitras hydrargyri.		Calcareous nitre.
Nitrate of mercury in solu- tion, Nitras hydrargyri solutus.	{	Mother water of nitre.
Nitrate of molybdena, Nitras molybdeni.		Nitre of magnesia.
Nitrate of nickel, Nitras niccoli.	{	Nitre of manganese.
		Mercurial nitre.
	{	Nitre of mercury.
		Mercurial water.

*New Names.**Ancient Names.*

Nitrate of platina, Nitræ platini.	
Nitrate of potash or nitre, Nitræ potassæ, vel nitrum.	} Nitre ; salt petre. Nitre of silver. Lunar crystals. Lunar caustic.
Nitrate of silver, Nitræ argenti.	
Nitrate of silver fused, Nitræ argenti fusus.	
Nitrate of soda, Nitræ sodæ.	
Nitrate of tin, Nitræ stanni.	} Cubic nitre. Rhomboidal nitre. Nitre of tin. Stanno-nitrous salt.
Nitrate of tunstlein, Nitræ tunstleni.	
Nitrate of zinc, Nitræ zinci.	} Nitre of zinc. Salts formed by the combination of <i>nitrous acid</i> * with different bases. This genus of salts had no name in the ancient nomenclature. It was not known before the late discoveries.
Nitrites, Nitris, tis, f. m.	
Nitrite of alumine, Nitris aluminosus.	
Nitrite of ammoniac, Nitris ammoniacalis.	
Nitrite of antimony, Nitris stibii.	
Nitrite of arsenic, Nitris arsenicalis.	
Nitrite of barytes, Nitris baryticus.	
Nitrite of bismuth, Nitris bismuthi.	
Nitrite of cobalt, Nitris cobalti.	
Nitrite of copper, Nitris cupri.	

* That is to say, by an acid of nitre containing less oxygen than that which we have denominated *nitric acid*, and which forms the *nitrate*.

New Names.

Ancient Names.

Nitrite of gold,
 Nitris auri.
 Nitrite of iron,
 Nitris ferri.
 Nitrite of lead,
 Nitris plumbi.
 Nitrite of lime,
 Nitris calcareus.
 Nitrite of magnesia,
 Nitris magnesiæ.
 Nitrite of manganese,
 Nitris magnesiæ.
 Nitrite of mercury,
 Nitris hydrargiri.
 Nitrite of molybdena,
 Nitris molybdeni.
 Nitrite of nickel,
 Nitris niccoli.
 Nitrite of platina,
 Nitris platini.
 Nitrite of potash,
 Nitris potassæ.
 Nitrite of silver,
 Nitris argenti.
 Nitrite of soda,
 Nitris sodæ.
 Nitrite of tin,
 Nitris stanni.
 Nitrite of tunstein,
 Nitris tunsteni.
 Nitrite of zinc,
 Nitris zinci.

O.

Oils empyreumatic.	}	Empyreumatic oils.
Olea empyreumatica.		
Oils fixed,	{	Fat oils.
Olea fixa.		Mild oils.
		Expressed oils.
Oils volatile,	{	Essential oils.
Olea volatilia.		Essences.

*New Names.**Ancient Names.*

Oxalates,
Oxalas, tis, f. m.

Salts formed by the combination of the oxalic acid with different bases.

The greater number of these salts have not been named in the old nomenclature.

Oxalate acidulous of ammoniac,

Oxalas acidulus ammoniacalis.

Oxalate acidulous of potash,
Oxalas acidulus potassæ. }

The salt of sorrel of commerce.

Oxalate acidulous of soda,
Oxalas acidulus sodæ.

Oxalate of alumine,
Oxalas aluminosus.

Oxalate of ammoniac,
Oxalas ammoniacalis.

Oxalate of antimony,
Oxalas stibii.

Oxalate of arsenic,
Oxalas arsenicalis.

Oxalate of barytes,
Oxalas baryticus.

Oxalate of bismuth,
Oxalas bismuthi.

Oxalate of cobalt,
Oxalas cobalti.

Oxalate of copper,
Oxalas cupri.

Oxalate of gold,
Oxalas auri.

Oxalate of iron,
Oxalas ferri.

Oxalate of lead,
Oxalas plumbi.

Oxalate of lime,
Oxalas calcareus.

Oxalate of magnesia,
Oxalas magnesiæ.

Oxalate of manganese,
Oxalas magnesi.

Oxalate of mercury,
Oxalas hydrargyri.

Oxalate

*New Names.**Ancient Names.*

Oxalate of molybdena, Oxalas molybdeni.	
Oxalate of nickel, Oxalas niccoli.	
Oxalate of platina, Oxalas platini.	
Oxalate of potash, Oxalas potassæ.	
Oxalate of silver, Oxalas argenti.	
Oxalate of soda, Oxalas sodæ.	
Oxalate of tin, Oxalas stanni.	
Oxalate of tunstien, Oxalas tunstieni.	
Oxalate of zinc, Oxalas zinci.	
Oxide arsenical of potash, Oxidum arsenicale potassæ.	} Liver of arsenic.
Oxide, white, of arsenic, Oxidum arsenici album.	
Oxide of antimony by the muriatic acid and nitric acid.	} Calx of arsenic.
Oxidum stibii acidis muriatico et nitrico confectum.	
Oxide of antimony, white, by nitre, Oxidum stibii album nitro confectum.	} Bezoar mineral.
Oxide of antimony, white, sublimed, Oxidum stibii album sublimatum.	
Oxide of antimony by the muriatic acid, Oxidum stibii acido muriatico confectum.	} Diaphoretic antimony. Ceruse of antimony. The pearly matter of Kerkringius. Snow of antimony. Flowers of antimony. Silvery flowers of regulus of antimony.
Oxide of antimony sulphurated, Oxidum stibii sulphuratum.	
	} Powder of algaroth.
	} Liver of antimony.

*New Names.**Ancient Names.*

Oxide of antimony sulphurated, semi-vitreous, Oxidum stibii sulphuratum semi-vitreum.	}	Crocus metallorum.
Oxide of antimony sulphurated, orange-coloured, Oxidum stibii sulphuratum aurantiacum.		
Oxide of antimony, red, sulphurated, Oxidum stibii sulphuratum rubrum.	}	Kermes mineral.
Oxide of antimony sulphurated vitreous, Oxidum stibii sulphuratum vitreum.		
Oxide of antimony, brown, vitreous sulphurated, Oxidum stibii sulphuratum vitreum fuscum.	}	Glaſs of antimony.
Oxide of arsenic, white, sublimed, Oxidum arsenici album sublimatum.		
Oxide of arsenic, yellow, sulphurated, Oxidum arsenici sulphuratum luteum.	}	Orpiment.
Oxide of arsenic, red, sulphurated, Oxidum arsenici sulphuratum rubrum.		
Oxide of bismuth, white, by the nitric acid, Oxidum bismuthi album acido nitrico confectum.	}	Magiſtery of bismuth, Spanish white.
Oxide of bismuth sublimed, Oxidum bismuthi sublimatum.		
Oxide of cobalt, grey, with filice; or zaffre, Oxidum cobalticinereum cum filice.	}	Zaffre.

*New Names.**Ancient Names.*

Oxide of cobalt, vitreous, Oxidum cobalti vitreum.	} Azure. Smalt.
Oxide of copper, green, Oxidum cupri viride.	} Verdegris. Rust of copper.
Oxide of gold, ammoniacal, Oxidum auri ammoniacale.	} Fulminating gold.
Oxide of gold by tin, Oxidum auriperstannum.	} Precipitate of gold by tin. Purple powder of Cassius.
Oxides of iron, Oxida ferri.	} Saffrons of mars.
Oxide of iron, brown, Oxidum ferri fuscum.	} Astringent saffron of mars.
Oxide of iron, yellow, Oxidum ferri luteum.	} Ochre.
Oxide of iron, black, Oxidum ferri nigrum.	} Martial ethiops.
Oxide of iron, red, Oxidum ferri rubrum.	} Colcothar.
Oxides of lead, Oxida plumbi.	} Calces of lead.
Oxide of lead, white, by the acetous acid, Oxidum plumbi album per acidum acetosum.	} White lead.
Oxide of lead, semi-vitreous ; or litharge, Oxidum plumbi semi-vitreum.	} Litharge.
Oxide of lead, yellow, Oxidum plumbi luteum.	} Massicot.
Oxide of lead, red ; or minium, Oxidum plumbi rubrum.	} Minium. Red lead.
Oxide of manganese, white, Oxidum magnesi album.	} White calx of manganese.
Oxide of manganese, black, Oxidum magnesi nigrum.	} Black magnesia.
Oxide of mercury, yellow, by the nitric acid, Oxidum hydrargiri luteum acido nitrico confectum,	} Nitrous turbith.

*New Names.**Ancient Names.*

Oxide of mercury, yellow, by the sulphuric acid, Oxidum hydrargyri luteum acido sulphurico confectum.	}	Turbith mineral. Yellow precipitate.
Oxide of mercury, blackish, Oxidum hydrargyri nigrum.		Æthiops per se.
Oxide of mercury, red, by the nitric acid, Oxidum hydrargyri rubrum acido nitrico confectum.	}	Red precipitate.
Oxide of mercury, red, by fire, Oxidum hydrargyri rubrum per ignem.		Precipitate per se.
Oxide of mercuryfulphurated, black, Oxidum hydrargyri sulphuratum nigrum.	}	Æthiops mineral.
Oxide of mercuryfulphurated, red, Oxidum hydrargyri sulphuratum rubrum.		Cinnabar.
Oxides metallic, Oxida metallica.	}	Calces of metals.
Oxides metallic sublimed, Oxida metallica sublimata.		Metallic flowers.
Oxide of tin, grey, Oxidum stanni cinereum.	}	Putty.
Oxide of tin sublimed, Oxidum stanni sublimatum.		Flowers of tin.
Oxide of zinc sublimed, Oxidum zinci sublimatum.	}	Flowers of zinc. Pompholix.
		Philosophical wool.
Oxigene, Oxygenium.	}	Oxigene. Base of vital air.
		Acidifying principle.
		Empyrean principle. Principium forbile.

P.

*New Names.**Ancient Names.*

Phosphate,
Phosphas, tis, f. m.

{ Salts formed by the union of
the phosphoric acid with dif-
ferent bases.

Phosphate of alumine,
Phosphas aluminosus.

Phosphate of ammoniac,
Phosphas ammoniacalis.

{ Phosphoric ammoniac.
Ammoniacal phosphate.

Phosphate of antimony,
Phosphas stibii.

Phosphate of arsenic,
Phosphas arsenicalis.

Phosphate of barytes,
Phosphas baryticus.

Phosphate of bismuth,
Phosphas bismuthi.

Phosphate of cobalt,
Phosphas cobalti.

Phosphate of copper,
Phosphas cupri.

Phosphate of gold,
Phosphas auri.

Phosphate of iron,
Phosphas ferri.

{ Syderite.
Bog ore.

Phosphate of lead,
Phosphas plumbi.

Phosphate of lime,
Phosphas calcareus.

{ Earth of bones.
Calcareous phosphate.
Animal earth.

Phosphate of magnesia,
Phosphas magnesiæ.

{ Phosphate of magnesia.

Phosphate of manganese,
Phosphas magnesii.

Phosphate of mercury,
Phosphas mercurii.

{ Lemery's rose-coloured precipi-
tate.

Phosphate of molybdena,
Phosphas molybdeni.

Phosphate of nickel,
Phosphas niccoli.

Phosphate of platina,
Phosphas platini.

Phosphate

*New Names.**Ancient Names.*

Phosphate of potash, Phosphas potassæ.	
Phosphate of silver, Phosphas argenti.	
Phosphate of soda, Phosphas sodæ.	
Phosphate of soda and am- moniac, Phosphas sodæ et am- moniacalis.	Native salt of urine. Fusible salts of urine.
Phosphate supersaturated with soda, Phosphas supersaturatus sodæ.	
Phosphate of tin, Phosphas stanni.	
Phosphate of tunstein, Phosphas tunsteni.	
Phosphate of zinc, Phosphas zinci.	
Phosphite, Phosphis, tis, f. m.	Salt formed by the combination of the phosphoreous acid with different bases.
Phosphite of alumine, Phosphis aluminosus.	
Phosphite of ammoniac, Phosphis ammoniacalis.	
Phosphite of antimony, Phosphis stibii.	
Phosphite of arsenic, Phosphis arsenicalis.	
Phosphite of barytes, Phosphis baryticus.	
Phosphite of bismuth, Phosphis bismuthi.	
Phosphite of cobalt, Phosphis cobalti.	
Phosphite of copper, Phosphis cupri.	
Phosphite of gold, Phosphis auri.	
Phosphite of iron, Phosphis ferri.	

Phosphite

*New Names.**Ancient Names.*

Phosphite of lead,
 Phosphis plumbi.
 Phosphite of lime,
 Phosphis calcareus.
 Phosphite of magnesia,
 Phosphis magnesiæ.
 Phosphite of manganese,
 Phosphis magnesi.
 Phosphite of mercury,
 Phosphis hydrargyri.
 Phosphite of molybdena,
 Phosphis molybdeni.
 Phosphite of nickel,
 Phosphis niccoli.
 Phosphite of platina,
 Phosphis platini.
 Phosphite of potash,
 Phosphis potassæ.
 Phosphite of silver,
 Phosphis argenti.
 Phosphite of soda,
 Phosphis sodæ.
 Phosphite of tin,
 Phosphis stanni.
 Phosphite of tunstein,
 Phosphis tunsteni.
 Phosphite of zinc,
 Phosphis zinci.
 Phosphorus,
 Phosphorum.
 Phosphure,
 Phosphoretum.
 Phosphure of copper,
 Phosphoretum cupri.
 Phosphure of iron,
 Phosphoretum ferri.
 Pyrolignites,
 Pyrolignis, tis, s. m.

} Phosphorus of Kunckel.
 } Combination of phosphorus not
 } oxygenated, with different bases.
 { Syderum, of Bergman.
 { Syderotete, of M. de Morveau.
 { Regulus of syderite.
 { Salts formed by the union of
 { the pyroligneous acid with
 { different bases.
 { These salts were not named in
 { the ancient nomenclature.

*New Names.**Ancient Names.*

Pyrolignite of alumine,	
Pyrolignis aluminosus.	
Pyrolignite of ammoniac,	
Pyrolignis ammoniacalis.	
Pyrolignite of antimony,	
Pyrolignis stibii.	
Pyrolignite of arsenic,	
Pyrolignis arsenicalis.	
Pyrolignite of barytes,	
Pyrolignis baryticus.	
Pyrolignite of bismuth,	
Pyrolignis bismuthi.	
Pyrolignite of cobalt,	
Pyrolignis cobalti.	
Pyrolignite of copper,	
Pyrolignis cupri.	
Pyrolignite of gold,	
Pyrolignis auri.	
Pyrolignite of iron,	
Pyrolignis ferri.	
Pyrolignite of lead,	
Pyrolignis plumbi.	
Pyrolignite of lime,	
Pyrolignis calcareus.	
Pyrolignite of magnesia,	
Pyrolignis magnesiæ.	
Pyrolignite of manganese,	
Pyrolignis magnesiæ.	
Pyrolignite of mercury,	
Pyrolignis mercurii.	
Pyrolignite of molybdena,	
Pyrolignis molybdeni.	
Pyrolignite of nickel,	
Pyrolignis niccoli.	
Pyrolignite of platina,	
Pyrolignis platini.	
Pyrolignite of potash,	
Pyrolignis potassæ.	
Pyrolignite of silver.	
Pyrolignis argenti.	
Pyrolignite of soda,	
Pyrolignis sodæ.	
Pyrolignite of tin,	
Pyrolignis stanni.	

New Names.

Ancient Names.

Pyrolignite of tunstein,
Pyrolignis tunsteni.
Pyrolignite of zinc,
Pyrolignis zinci.

Pyromucites,
Pyromucis, tis, f. m.

{ Salts formed by the union
of the pyromucous acid
with different bases.
This genus of salts was not
named in the old nomen-
clature.

Pyromucite of alumine.
Pyromucis aluminosus.
Pyromucite of ammoniac,
Pyromucis ammoniacalis.
Pyromucite of antimony,
Pyromucis stibii.
Pyromucite of arsenic,
Pyromucis arsenicalis.
Pyromucite of barytes,
Pyromucis baryticus.
Pyromucite of bismuth,
Pyromucis bismuthi.
Pyromucite of cobalt,
Pyromucis cobalti.
Pyromucite of copper,
Pyromucis cupri.
Pyromucite of gold,
Pyromucis auri.
Pyromucite of iron,
Pyromucis ferri.
Pyromucite of lead,
Pyromucis plumbi.
Pyromucite of lime,
Pyromucis calcareus.
Pyromucite of magnesia,
Pyromucis magnesiæ.
Pyromucite of manganese,
Pyromucis magnesii.
Pyromucite of mercury,
Pyromucis mercurii.
Pyromucite of molybdena,
Pyromucis molybdeni.
Pyromucite of nickel,
Pyromucis niccoli.

Pyro.

*New Names.**Ancient Names.*

Pyromucite of platina,
Pyromucis platini.

Pyromucite of potash.
Pyromucis potassæ.

Pyromucite of silver,
Pyromucis argenti.

Pyromucite of soda,
Pyromucis sodæ.

Pyromucite of tin,
Pyromucis stanni.

Pyromucite of tunstein,
Pyromucis tunsteni.

Pyromucite of zinc,
Pyromucis zinci.

Pyrotartrites,
Pyrotartris, tis, f. m.

{ Salts formed by the combination of the pyrotartareous acid with different bases.

Pyrotartrite of alumine,
Pyrotartris aluminosus.

Pyrotartrite of ammoniac,
Pyrotartris ammoniaci.

Pyrotartrite of antimony,
Pyrotartris stibii.

Pyrotartrite of arsenic,
Pyrotartris arsenici.

Pyrotartrite of barytes,
Pyrotartris baryticus.

Pyrotartrite of bismuth,
Pyrotartris bismuthi.

Pyrotartrite of cobalt,
Pyrotartris cobalti.

Pyrotartrite of copper,
Pyrotartris cupri.

Pyrotartrite of gold,
Pyrotartris auri.

Pyrotartrite of iron,
Pyrotartris ferri.

Pyrotartrite of lead,
Pyrotartris plumbi.

Pyrotartrite of lime,
Pyrotartris calcareus.

Pyrotartrite of magnesia,
Pyrotartris magnesiæ.

Pyro-

New Names.

Ancient Names.

Pyrotartrite of manganese,
 Pyrotartris magnesi.
 Pyrotartrite of mercury,
 Pyrotartris hydrargyri.
 Pyrotartrite of molybdena,
 Pyrotartris molybdeni.
 Pyrotartrite of nickel,
 Pyrotartris niccoli.
 Pyrotartrite of platina,
 Pyrotartris platini.
 Pyrotartrite of potash,
 Pyrotartris potassæ.
 Pyrotartrite of silver,
 Pyrotartris argenti.
 Pyrotartrite of soda,
 Pyrotartris sodæ.
 Pyrotartrite of tin,
 Pyrotartris stanni.
 Pyrotartrite of tunstein,
 Pyrotartris tunsteni.
 Pyrotartrite of zinc,
 Pyrotartris zinci.

Platina,
 Platinum.

Potash,
 Potassa, æ, f.
 Potash fused,
 Potassa fusa.
 Potash, filiciated, fluid,
 Potassa filicea fluida.

Prussiates,
 Prussias, tis, f. m.

Prussiate of alumine,
 Prussias aluminosus.
 Prussiate of ammoniac,
 Prussias ammoniacalis.
 Prussiate of antimony,
 Prussias antimonii.

{ Juan blanca.
 { Platina.
 { Platina del pinto.
 { Caustic vegetable fixed alkali.
 { Lapis causticus.
 { Liquor of flints.
 { Salts formed by the union of
 { the Prussic acid, or colour-
 { ing matter of Prussian
 { blue, with different bases.
 { This genus of salts had no
 { name in the old nomencla-
 { ture.

*New Names.**Ancient Names.*

Prussiate of arsenic, Prussias arsenicalis.	
Prussiate of barytes, Prussias baryticus.	
Prussiate of bismuth, Prussias bismuthi.	
Prussiate of cobalt, Prussias cobalti.	
Prussiate of copper, Prussias cupri.	
Prussiate of gold, Prussias auri.	
Prussiate of iron, Prussias ferri.	} Prussian blue. } Berlin blue.
Prussiate of lead, Prussias plumbi.	
Prussiate of lime, Prussias calcareus.	} Calcareous prussiate. } Prussian lime-water.
Prussiate of magnesia, Prussias magnesiæ.	
Prussiate of manganese, Prussias magnesi.	
Prussiate of mercury, Prussias hydrargyri.	
Prussiate of molybdena, Prussias molybdeni.	
Prussiate of nickel, Prussias niccoli.	
Prussiate of platina, Prussias platini.	
Prussiate of potash, Prussias potassæ.	} Liquor saturated with the co- louring matter of Prussian blue.
Prussiate of potash ferrugi- nous, saturated, Prussias potassæ ferrugi- nosus saturatus.	
Prussiate of potash ferrugi- nous, not saturated, Prussias potassæ ferrugi- nosus non saturatus.	} Phlogisticated alkali.
Prussiate of silver, Prussias argenti.	
Prussiate of soda, Prussias sodæ.	

*New Names.**Ancient Names.*

Prussiate of tin, Prussias stanni.	
Pyrophore of Homberg, Pyrophorum Hombergii.	} Pyrophorus of Homberg.

R.

Refins, Refinæ.	} Refins.
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S.

Saccholates, Saccholas, tis, f. m.	{ Salts formed by the combination of the saccholactic acid with different bases. This genus of salts was not named in the ancient nomenclature.
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Saccholate of alumine,
Saccholas aluminosus.

Saccholate of ammoniac,
Saccholas ammoniacalis.

Saccholate of antimony,
Saccholas stibii.

Saccholate of arsenic,
Saccholas arsenicalis.

Saccholate of barytes,
Saccholas baryticus.

Saccholate of bismuth,
Saccholas bismuthi.

Saccholate of cobalt,
Saccholas cobalti.

Saccholate of copper,
Saccholas cupri.

Saccholate of gold,
Saccholas auri.

Saccholate of iron,
Saccholas ferri.

Saccholate of lead,
Saccholas plumbi.

Saccholate of lime,
Saccholas calcareus.

*New Names.**Ancient Names.*

Saccholate of magnesia,
 Saccholas magnesiæ.
 Saccholate of manganese,
 Saccholas magnesiæ.
 Saccholate of mercury,
 Saccholas hydrargyri.
 Saccholate of molybdena,
 Saccholas molybdeni.
 Saccholate of nickel,
 Saccholas niccoli.
 Saccholate of platina,
 Saccholas platini.
 Saccholate of potash,
 Saccholas potassiæ.
 Saccholate of silver,
 Saccholas argenti.
 Saccholate of soda,
 Saccholas sodæ.
 Saccholate of tin,
 Saccholas stanni.
 Saccholate of tunstein,
 Saccholas tunsteni.
 Saccholate of zinc,
 Saccholas zinci.

Savonules,
 Saponuli.

Savonules acid.

Savonule of alumine,
 Saponulus aluminosus.

Savonule ammoniacal,
 Saponulus ammoniacalis.

Savonule of barytes,
 Saponulus barytæ.

Savonule of lime,
 Saponulus calcareus.

Savonules metallic,
 Saponuli metallici.

Savonule of potash,
 Saponulus potassiæ.

{ Combinations of the volatile or
 essential oils with different
 bases.

{ Combinations of the volatile or
 essential oils with the different
 acids.

{ Soap composed of volatile oil
 united to the base of alum.

{ Soap composed of volatile oil
 united to ammoniac.

{ Soap composed of volatile oil
 united to barytes.

{ Soap composed of volatile oil
 united to lime.

{ Soaps composed of the volatile
 oils united to metallic sub-
 stances.

{ Soap composed of volatile oil
 united to vegetable fixed al-
 ali, to *Starkey's soap*.

Saponul

New Names.

Savonule of foda,
Saponulus fodæ.

Sebates,
Sebas, tis, f. m.

Sebate of alumine,
Sebas aluminosus.
Sebate of ammoniac,
Sebas ammoniacalis.
Sebate of antimony,
Sebas stibii.
Sebate of arsenic,
Sebas arsenicalis.
Sebate of barytes,
Sebas baryticus.
Sebate of bismuth,
Sebas bismuthi.
Sebate of cobalt,
Sebas cobalti.
Sebate of copper,
Sebas cupri.
Sebate of gold,
Sebas auri.
Sebate of iron,
Sebas ferri.
Sebate of lead,
Sebas plumbi.
Sebate of lime,
Sebas calcareus.
Sebate of magnesia,
Sebas magnesiæ.
Sebate of manganese,
Sebas magnesii.
Sebate of mercury,
Sebas hydrargyri.
Sebate of molybdæna,
Sebas molybdeni.
Sebate of nickel,
Sebas niccoli.
Sebate of platina,
Sebas platini.

Ancient Names.

{ Soap composed of volatile oil
united to mineral fixed al-
kali, or foda.
{ Salts formed by the combination
of the acid of fat, or sebacic
acid, with different bases.
{ These salts had no names in the
ancient nomenclature.

*New Names.**Ancient Names.*

Sebate of potash, Sebas potassæ.	
Sebate of silver, Sebas argenti.	
Sebate of soda, Sebas sodæ.	
Sebate of tin, Sebas stanni.	
Sebate of tunstein, Sebas tunsteni.	
Sebate of zinc, Sebas zinci.	
Semi-metals.	Semi-metals.
Silice, or siliceous earth, Silica, terra silicea.	{ Quartzose earth.
	{ Siliceous earth.
	{ Vitriifiable earth.
Soda, Soda.	{ Caustic soda.
	{ Marine alkali.
	{ Mineral alkali.
Soaps, Sapones.	{ Combinations of unctuous or
	{ fixed oils with different bases.
Soaps acid, Sapones acidi.	{ Combinations of unctuous or
	{ fixed oils with different acids.
Soap of alumine, Sapo aluminosus.	{ Soap composed of fixed oil
	{ united to the basis of alum.
Soap of ammoniac, or ammo- niacal, Sapo ammoniacalis.	{ Soap composed of fixed oil
	{ united to volatile alkali.
Soap of barytes, Sapo baryticus.	{ Soap composed of fixed oil
	{ united to barytes.
Soap of lime, Sapo calcareus.	{ Soap composed of fixed oil
	{ united to lime.
Soap of magnesia, Sapo magnesiæ.	{ Soap composed of fixed oil
	{ united to magnesia.
Soaps metallic, Sapones metallici	{ Combinations of fixed oils with
	{ metallic substances.
Soap of potash, Sapo potassic.	{ Soap composed of fixed oil
	{ united to vegetable fixed al-
	{ kali.
Soap of soda, Sapo sodæ.	{ Soap composed of fixed oil
	{ united to mineral fixed al-
	{ kali.
Starch, Amylum.	{ Starch.

*New Names.**Ancient Names.*

Steel,	}	Steel.
Chalybs.		
Succinates,	}	Salts formed by the combination of the acid of amber, or succi- nic acid, with different bases.
Succinas, tis, f. m.		
Succinate of alumine,		
Succinas aluminosus.		
Succinate of ammoniac,		
Succinas ammoniacalis.		
Succinate of antimony,		
Succinas stibii.		
Succinate of arsenic,		
Succinas arsenicalis.		
Succinate of barytes,		
Succinas baryticus.		
Succinate of bismuth,		
Succinas bismuthi.		
Succinate of cobalt,		
Succinas cobalti.		
Succinate of copper,		
Succinas cupri.		
Succinate of gold,		
Succinas auri.		
Succinate of iron,		
Succinas ferri.		
Succinate of lead,		
Succinas plumbi.		
Succinate of lime,		
Succinas calcareus.		
Succinate of magnesia,		
Succinas magnesiæ.		
Succinate of manganese,		
Succinas magnesi.		
Succinate of mercury,		
Succinas hydrargyri.		
Succinate of molybdena,		
Succinas molybdeni.		
Succinate of nickel,		
Succinas niccoli.		
Succinate of platina,		
Succinas platini.		
Succinate of potash,		
Succinas potassæ.		

*New Names.**Ancient Names.*

Succinate of silver, Succinas argenti.	
Succinate of soda, Succinas sodæ.	
Succinate of tin, Succinas stanni.	
Succinate of tunstein, Succinas tunsteni.	
Succinate of zinc, Succinas zinci.	
Succinum, or amber, Succinum.	} Yellow amber.
Sugar, Saccharum.	
Sugar crystallised, Saccharum crystallifatum.	} Sugar.
Sugar of milk, Saccharum lactis.	
Sulphates, Sulphas aluminosus.	} Sugar candied.
Sulphate of ammoniac, Sulphas ammoniacalis.	
Sulphate of antimony, Sulphas stibii.	} Sugar of milk.
Sulphate of arsenic, Sulphas arsenicalis.	
Sulphate of barytes, Sulphas baryticus.	} Salt of milk.
Sulphate of bismuth, Sulphas bismuthi.	
Sulphate of cobalt, Sulphas cobalti.	} Alum.
Sulphate of copper, Sulphas cupri.	
Sulphate of iron, Sulphas ferri.	} Vitriol of clay.
Sulphate of gold, Sulphas auri.	
Sulphate of lead, Sulphas plumbi.	} The secret ammoniacal salt of Glauber.
	} Ammoniacal vitriol.
	} Vitriol of antimony.
	} Vitriol of arsenic.
	} Ponderous spar.
	} Barytic vitriol.
	} Vitriol of bismuth.
	} Vitriol of cobalt.
	} Cyprian vitriol, blue vitriol.
	} Vitriol of copper, or of Venus.
	} Blue copperas.
	} Green copperas.
	} Martial vitriol.
	} Green vitriol.
	} Vitriol of iron.
	} Vitriol of lead.

New Names.

Ancient Names.

Sulphate of lime,
Sulphas calcareus.

Sulphate of magnesia;
Sulphus magnesiæ.

Sulphate of manganese,
Sulphas magnesi.

Sulphate of mercury,
Sulphas hydrargyri.

Sulphate of molybdena,
Sulphas molybdeni.

Sulphate of nickel,
Sulphas niccoli.

Sulphate of platina,
Sulphas platini.

Sulphate of potash.
Sulphas potassæ.

Sulphate of silver,
Sulphas argenti.

Sulphate of soda,
Sulphas sodæ.

Sulphate of tin,
Sulphas stanni.

Sulphate of tunstein,
Sulphas tunsteni.

Sulphate of zinc,
Sulphas zinci.

Sulphite,
Sulphis, tis, f. m.

Sulphite of alumine.
Sulphis aluminosus.

Sulphite of ammoniac,
Sulphis ammoniacalis.

Sulphite of antimony,
Sulphis stibii.

{ Vitriol of lime.
Selenite.
Gypsum.
Calcareous vitriol.
Magneſian vitriol.
Bitter purging ſalt.
Sedlitz ſalt.
Epſom ſalt.
Seydschutz ſalt.
Vitriol of manganese.
Vitriol of mercury.

{ Vitriolated vegetable alkali.
Sal de duobus.
Vitriolated tartar.
Arcanum duplicatum.
Sal polychrest of Glaſer.
Vitriol of silver.
Lunar vitriol.
Glauber's salt.
Vitriol of ſoda.
Vitriol of tin.

{ White vitriol, or copperas.
Vitriol of zinc.
Vitriol of Goſlar.
Salt formed by the combination
of the ſulphureous acid with
different baſes.

*New Names.**Ancient Names.*

Sulphite of arsenic,
Sulphis arsenicalis.

Sulphite of barytes,
Sulphis baryticus.

Sulphite of bismuth,
Sulphis bismuthi.

Sulphite of cobalt,
Sulphis cobalti.

Sulphite of copper,
Sulphis cupri.

Sulphite of gold,
Sulphis auri.

Sulphite of iron,
Sulphis ferri.

Sulphite of lead,
Sulphis plumbi.

Sulphite of lime,
Sulphis calcareus.

Sulphite of magnesia,
Sulphis magnesiæ.

Sulphite of manganese,
Sulphis magnesi.

Sulphite of mercury,
Sulphis hydrargyri.

Sulphite of molybdena,
Sulphis molybdeni.

Sulphite of nickel,
Sulphis niccoli.

Sulphite of platina,
Sulphis platini.

Sulphite of potash,
Sulphis potassæ.

Sulphite of silver,
Sulphis argenti.

Sulphite of soda,
Sulphis sodæ.

Sulphite of tin,
Sulphis stanni.

Sulphite of tunstein,
Sulphis tunsteni.

Sulphite of zinc,
Sulphis zinci.

Sulphur,
Sulphur.

} Sulphureous salt of Stahl.

} Sulphur.

Sulphur

*New Names.**Ancient Names.*

Sulphur sublimed,	}	Flowers of sulphur.
Sulphur sublimatum.		
Sulphure alkaline,	}	Alkaline liver of silver.
Sulphuretum alkalinum.		Alkaline hepar.
Sulphure of alumine,	}	
Sulphuretum aluminæ.		
Sulphure of ammoniac,	}	Boyle's fuming liquor.
Sulphuretum ammoniacale.		Volatile alkaline liver of sulphur.
Sulphure of antimony,	}	Antimony.
Sulphuretum stibii.		
Sulphure of antimony, native,	}	Ore of antimony.
Sulphuretum stibii nativum.		
Sulphure of barytes,	}	Barytic liver of sulphur.
Sulphuretum barytæ.		
Sulphure of bismuth,	}	
Sulphuretum bismuthi.		
Sulphure calcareous,	}	Calcareous liver of sulphur.
Sulphuretum calcareum.		
Sulphure of cobalt,	}	
Sulphuretum cobalti.		
Sulphure of copper,	}	Pyrites of copper.
Sulphuretum cupri.		
Sulphure earthy,	}	Earthy liver of sulphur.
Sulphuretum terreum.		Earthy hepar.
Sulphure of gold,	}	
Sulphuretum auri.		
Sulphure of iron,	}	Martial pyrites.
Sulphuretum ferri.		
Sulphure of fixed oil,	}	Balsam of sulphur.
Sulphuretum olei fixi.		
Sulphure of volatile oil,	}	Balsam of sulphur.
Sulphuretum olei volatilis.		
Sulphure of lead,	}	
Sulphuretum plumbi.		
Sulphure of magnesia,	}	Magnesian liver of sulphur.
Sulphuretum magnesiæ.		
Sulphure of manganese,	}	
Sulphuretum magnesiæ.		
Sulphure of mercury,	}	
Sulphuretum hydrargyri.		

Sulphure

*New Names.**Ancient Names.*

Sulphures metallic,	}	Combinations of sulphur with the metals.
Sulphureta metallica.		
Sulphure of molybdena,		
Sulphuretum molybdeni.		
Sulphure of nickel,		
Sulphuretum niccoli.		
Sulphure of platina,		
Sulphuretum platini.		
Sulphure of potash,	}	Liver of sulphur with base of the vegetable alkali.
Sulphuretum potassæ.		
Sulphure of potash antimoniated.	}	Antimoniated liver of sulphur.
Sulphuretum potassæ stibiatum.		
Sulphure of tin,		
Sulphuretum stanni.		
Sulphure of tunstein,		
Sulphuretum tunsteni.		
Sulphure of zinc,	}	Blende, or mock galena.
Sulphuretum zinci.		

T.

Tartar,	}	Crude tartar.
Tartarus.		
Tartrite,	}	Salt formed by the combination of the tartareous acid with different bases.
Tartris, tis, f. m.		
Tartrite acidulous of potash,	}	Tartar.
Tartris acidulus potassæ.		Cream of tartar.
		Crystals of tartar.
Tartrite of alumine,		
Tartris aluminosus.		
Tartrite of ammoniac,	}	Ammoniacal tartar.
Tartris ammoniacalis.		Tartareous sal ammoniac.
Tartrite of antimony,		
Tartris stibii.		
Tartrite of arsenic,		
Tartris arsenicalis.		
Tartrite of barytes,		
Tartris baryticus.		
Tartrite of bismuth,		
Tartris bismuthi.		

Tartrite

*New Names.**Ancient Names.*

Tartrite of cobalt, Tartris cobalti.	
Tartrite of copper, Tartris cupri.	
Tartrite of gold, Tartris auri.	
Tartrite of iron, Tartris ferri.	
Tartrite of lime, Tartris calcareus.	} Calcareous tartar.
Tartrite of lead, Tartris plumbi.	
Tartrite of magnesia, Tartris magnesiæ.	} Saturnine tartar.
Tartrite of manganese, Tartris magnesii.	
Tartrite of mercury, Tartris hydrargyri.	
Tartrite of molybdena, Tartris molybdeni.	
Tartrite of nickel, Tartris niccoli.	
Tartrite of platina, Tartris platini.	
Tartrite of potash, Tartris potassæ.	} Tartarised tartar. Soluble tartar. Tartar of potash. Vegetable salt.
Tartrite of potash antimo- niated, Tartris potassæ stibiatus.	
Tartrite of potash, ferrugi- nous, Tartris potassæ ferrugi- neus.	
Tartrite of potash, surcom- pounded with antimony, Tartris potassæ stibiatus.	
Tartrite of silver, Tartris argenti.	} Tartarised tartar containing an- timony.
Tartrite of soda, Tartris sodæ.	
	} Tartar of soda. Sal polychrest of Rochelle. Salt of Seignette.

Tartrite

*New Names.**Ancient Names.*

Tartrite of tin,
Tartris stanni.

Tartrite of tunstein,
Tartris tunsteni.

Tartrite of zinc,
Tartris zinci.

Tin,
Stannum.

Tunstates,
Tunstas, tis, f. m.

Tunstate of alumine,
Tunstas aluminosus.

Tunstate of ammoniac,
Tunstas ammoniacalis

Tunstate of antimony,
Tunstas stibii.

Tunstate of arsenic,
Tunstas arsenicalis.

Tunstate of barytes,
Tunstas baryticus.

Tunstate of bismuth,
Tunstas bismuthi.

Tunstate of cobalt,
Tunstas cobalti.

Tunstate of copper,
Tunstas cupri.

Tunstate of gold,
Tunstas auri.

Tunstate of iron,
Tunstas ferri.

Tunstate of lead,
Tunstas plumbi.

Tunstate of lime,
Tunstas calcareus.

Tunstate of magnesia,
Tunstas magnesicæ.

Tunstate of manganese,
Tunstas magnesi.

Tunstate of mercury,
Tunstas hydrargyri.

{ Tin.
Jupiter.
Salts formed by the combination of the tunstic acid with different bases.
This genus of salts was not named in the ancient nomenclature.

New Names.

Ancient Names.

Tunstate of molybdena,
 Tunſtas molybdeni.
 Tunstate of nickel,
 Tunſtas niccoli.
 Tunstate of platina,
 Tunſtas platini.
 Tunstate of poſaſh,
 Tunſtas potaſſæ.
 Tunstate of ſilver,
 Tunſtas argenti.
 Tunstate of ſoda,
 Tunſtas ſodæ.
 Tunstate of tin,
 Tunſtas ſtanni.
 Tunstate of tunſtein,
 Tunſtas tunſteni.
 Tunstate of zinc.
 Tunſtas zinci.

W.

Water.	Water.
Water, lime.	Lime water.
Water diſtilled.	Diſtilled water.
Waters impregnated with the } carbonic acid.	Acidulated waters.
Waters ſulphurated.	Gazeous waters.
	Hepatic waters.

Z.

Zinc.	Zinc.
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TABLE OF THE CHYMICAL NOMENCLATURE.

Proposed by Messrs. De Morveau, Lavoisier, Berthollet, and De Fourcroy, in May, 1787.

(No. II. to be placed at the End of the Supplement to Fourcroy's Chemistry.

	I. SUBSTANCES NOT DECOMPOSED.		II. CONVERTED INTO THE STATE OF GAS BY CALORIC.		III. COMBINED WITH OXYGENE.		IV. GASEOUS AND OXYGENATED.		V. OXYGENATED WITH BASES.		VI. COMBINED WITHOUT BEING CONVERTED INTO THE ACID STATE.		
	NEW NAMES.	ANCIENT NAMES.	NEW NAMES.	ANCIENT NAMES.	NEW NAMES.	ANCIENT NAMES.	NEW NAMES.	ANCIENT NAMES.	NEW NAMES.	ANCIENT NAMES.	NEW NAMES.	ANCIENT NAMES.	
1	Light.												1
2	Caloric.	Caloric heat, or the matter of heat.											2
3	Oxygen.	Base of acids.	De-phlogisticated gas. N.B. It is pure gas that light is due to, and is not the state of gas.	De-phlogisticated gas, or vitæ gas.									3
4	Hydrogen.	Base of inflammable gas.	Hydrogenous gas.	Inflammable gas.	Water.	Water.							4
5	Air, or the Nitrogenous.	Base of phlogisticated air, or the common phlogisticated air.	Azote.	Phlogisticated air, or atmospheric phlogisticated.	Base of nitrous gas. Nitric acid. And with itself of azote. Nitrous acid.	Base of nitrous gas. Nitric acid. And with itself of azote. Nitrous acid.	Nitrous gas.	Nitrous acid gas.	Nitrous gas.	Nitrous acid gas.			5
6	Carbon, or the Carbonic acid.	Part charcoal.			Carbonic acid.	Fixed air, or carbonic acid.	Carbonic acid gas.	Fixed air, or carbonic acid.	Carbonic acid.	Fixed air, or carbonic acid.	Carbonic acid.	Fixed air, or carbonic acid.	6
7	Sulphur, or the Sulphuric acid.				Sulphuric acid.	Vitreous acid.			Sulphuric acid.	Vitreous acid.	Sulphuric acid.	Vitreous acid.	7
8	Phosphorus, or Phosphoric acid.				Phosphoric acid.	Phosphoric acid.			Phosphoric acid.	Phosphoric acid.	Phosphoric acid.	Phosphoric acid.	8
9	Muriatic acid.				Muriatic acid.	Muriatic acid.	Muriatic acid gas.	Muriatic acid gas.	Muriatic acid.	Muriatic acid.	Muriatic acid.	Muriatic acid.	9
10	Boric acid.				Boric acid.	Selenic acid.			Boric acid.	Selenic acid.	Boric acid.	Selenic acid.	10
11	Fluoric acid.				Fluoric acid.	Acid of fluor.	Fluoric acid gas.	Sparry acid gas.	Fluoric acid.	Acid of fluor.	Fluoric acid.	Acid of fluor.	11
12	Silicic acid.				Silicic acid.	Acid of silica.			Silicic acid.	Acid of silica.	Silicic acid.	Acid of silica.	12
13	Arctic acid.				Arctic acid.	Acid of arsenic.			Arctic acid.	Acid of arsenic.	Arctic acid.	Acid of arsenic.	13
14	Tartaric acid.				Tartaric acid.	Acid of tartar.			Tartaric acid.	Acid of tartar.	Tartaric acid.	Acid of tartar.	14
15	Pyro-tartaric acid.				Pyro-tartaric acid.	Acid of tartar.			Pyro-tartaric acid.	Acid of tartar.	Pyro-tartaric acid.	Acid of tartar.	15
16	Oelic acid.				Oelic acid.	Acid of oil.			Oelic acid.	Acid of oil.	Oelic acid.	Acid of oil.	16
17	Gellie acid.				Gellie acid.	Acid of gell.			Gellie acid.	Acid of gell.	Gellie acid.	Acid of gell.	17
18	Citric acid.				Citric acid.	Acid of cit.			Citric acid.	Acid of cit.	Citric acid.	Acid of cit.	18
19	Malic acid.				Malic acid.	Acid of mal.			Malic acid.	Acid of mal.	Malic acid.	Acid of mal.	19
20	Benzoic acid.				Benzoic acid.	Acid of ben.			Benzoic acid.	Acid of ben.	Benzoic acid.	Acid of ben.	20
21	Pyro-benzoic acid.				Pyro-benzoic acid.	Acid of ben.			Pyro-benzoic acid.	Acid of ben.	Pyro-benzoic acid.	Acid of ben.	21
22	Pyro-mucic acid.				Pyro-mucic acid.	Acid of muc.			Pyro-mucic acid.	Acid of muc.	Pyro-mucic acid.	Acid of muc.	22
23	Camphoric acid.				Camphoric acid.	Acid of cam.			Camphoric acid.	Acid of cam.	Camphoric acid.	Acid of cam.	23
24	Lactic acid.				Lactic acid.	Acid of lac.			Lactic acid.	Acid of lac.	Lactic acid.	Acid of lac.	24
25	Saccharic acid.				Saccharic acid.	Acid of sac.			Saccharic acid.	Acid of sac.	Saccharic acid.	Acid of sac.	25
26	Fumaric acid.				Fumaric acid.	Acid of fum.			Fumaric acid.	Acid of fum.	Fumaric acid.	Acid of fum.	26
27	Prulic acid.				Prulic acid.	Acid of prul.			Prulic acid.	Acid of prul.	Prulic acid.	Acid of prul.	27
28	Schaleic acid.				Schaleic acid.	Acid of sch.			Schaleic acid.	Acid of sch.	Schaleic acid.	Acid of sch.	28
29	Utric acid.				Utric acid.	Acid of utr.			Utric acid.	Acid of utr.	Utric acid.	Acid of utr.	29
30	Bombic acid.				Bombic acid.	Acid of bomb.			Bombic acid.	Acid of bomb.	Bombic acid.	Acid of bomb.	30
OXIDES WITH VARIOUS BASES.													
31	Asenic.	Regulus of arsenic.			White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of potash, &c.	Asenic oxide of potash, &c.	Asenic oxide of potash, &c.	Asenic oxide of potash, &c.	31
32	Molybdic.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of copper, &c.	Asenic oxide of copper, &c.	Asenic oxide of copper, &c.	Asenic oxide of copper, &c.	32
33	Tungstic.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	33
34	Manganic.	Regulus of manganese.			White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	34
35	Nickelic.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	35
36	Cobaltic.	Regulus of cobalt.			White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	36
37	Bismuthic.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	37
38	Antimonic.	Regulus of antimony.			White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	38
39	Zincic.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	39
40	Iron.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	40
41	Tin.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	41
42	Lead.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	42
43	Copper.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	43
44	Mercury.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	44
45	Silver.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	45
46	Gold.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	46
47	Platinum.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	47
48	Alumina.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	48
49	Silica.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	49
50	Fluorine.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	50
51	Chlorine.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	51
52	Bromine.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	52
53	Iodine.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	53
54	Hydrogen.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	54
55	Air.				White arsenic, or oxide of arsenic.	White arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Yellow arsenic, or oxide of arsenic.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	Asenic oxide of iron, &c.	55

NAMES GIVEN TO SEVERAL MORE COMPOUND SUBSTANCES WHICH COMBINE WITHOUT DECOMPOSITION.

NEW NAMES.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Mucous.	Glyceric.	Sugary.	Starch.	Ferrous.	Volatiles.	Azotic.	Refractory.	Esther.	Butyric.	Resinous.	Ferrous.	Alcohol.	Alcohol.	Alcohol.	Alcohol.	Alcohol.	Alcohol.
Mucous.	Glyceric.	Sugary.	Starch.	Ferrous.	Volatiles.	Azotic.	Refractory.	Esther.	Butyric.	Resinous.	Ferrous.	Alcohol.	Alcohol.	Alcohol.	Alcohol.	Alcohol.	Alcohol.

As the table is printed, one of the parts of the column is converted into the first of gas, &c. as may be seen above them, we have changed the order of the column, and by the use of that which we have substituted we express certain combinations of particles.



CLASS I. Oviparous Quadrupeds which have a Tail.

CLASS II. Oviparous Quadrupeds which have no Tail.

FIRST GENUS.

TORTOISES.

The bag covered with a hard or continuous covering.

I. DIVISION.		II. DIVISION continued.	
SPECIES.		CHARACTERS.	
<i>Tetraodon</i>	The scales small, and nearly equal.	Yellow T. <i>T. Fovea</i> .	The shell green, with yellow spots.
<i>T. lineatus</i>	The scales green, with yellow spots.	Soft T. <i>T. Mollis</i> .	The covering soft, and without any scales properly so called.
<i>T. Nigrescens</i>	The scales black, with yellow spots.	Greek T. <i>T. Graeca</i> .	The covering very convex, the border very broad, the two covered by a membrane.
<i>T. Cuvieri</i>	The scales of the shell plate alone over the scales like this.	Geometrical T. <i>T. Geometricus</i> .	Yellow radii, which unite upon each side in a centre of the same colour.
<i>T. Luthi</i>	The covering of the shell plate alone, having five ridges lengthways.	Rough T. <i>T. Reticulatus</i> .	The scales whitish, shining very narrow blackish bands, those of the middle of the disc more in ridges, the lower plates continued below.
II. DIVISION.			
The scales very small, and nearly equal.			
<i>T. Mollis</i>	The scales black, with yellow spots.	Convex T. <i>T. Convexus</i> .	The covering very convex, the scales greenish, radiated with yellow, the breast-plate oval.
<i>T. Reticulatus</i>	The scales black, with yellow spots.	Vermillion T. <i>T. Vermilion</i> .	The scales of the covering very small, with black white, purple greenish, and yellow.
<i>T. Reticulatus</i>	The scales black, with yellow spots.	Short-tailed T. <i>T. Brevicauda</i> .	The covering scolloped before the scales black at the edge, white in the middle.
<i>T. Reticulatus</i>	The scales black, with yellow spots.	Chagrin T. <i>T. Chagrin</i> .	The disc brown and chagrin.
<i>T. Reticulatus</i>	The scales black, with yellow spots.	Ruddy T. <i>T. Ruddy</i> .	Three colour red, the covering flatish, and scales thin.
<i>T. Reticulatus</i>	The scales black, with yellow spots.	Blackish T. <i>T. Nigrescens</i> .	The covering brown, blackish the scales thin and very soft the touch.

S E C O N D G E N U S.

L I Z A R D S.

The body without a hard or continuous covering.

[illegible]

B I P E D R E P T I L E S.

I. DIVISION.		II. DIVISION.	
Two long feet.		Two hind feet.	
SPECIES.	CHARACTERS.	SPECIES.	CHARACTERS.
<i>Bipolar Cannelé.</i>	Half rings on the body and on the belly, entire rings on the tail, which is very short.	<i>Strophop.</i>	A longitudinal furrow on each side of the body, the activity aperture considerably larger, the tail at least as long as the body.

FIRST GENUS. SECOND GENUS. THIRD GENUS.

WATER FROGS

(GRENVILLE)

The head and body long, the
one or the other angular.

SECOND GENUS.

P. R. O'G. S.
A. L. L. M. F. S.

(K. A. I. N. E. S.)

The body long, and several balls
beneath the toes.

THIRD GENUS.

T O A D S.

(C R A P A U D S.)

The belly short and round.

hemistry.]

no Tail.

four, the belly yellow, spotted with black.

The back spotted with brown, the shoulders raised, and very porous, five toes on each foot.

