

NOTES ON

LEAD ORES

JAS. FAIRIE, F.G.S.

UC-NRLF



QB 276 670

YB 15570

LIBRARY  
OF THE  
UNIVERSITY OF CALIFORNIA.

*Class* 569







# NOTES ON LEAD ORES

THEIR DISTRIBUTION AND  
PROPERTIES

BY

JAMES FAIRIE, F.G.S.

||



LONDON

SCOTT, GREENWOOD & CO.

19 LUDGATE HILL, E.C.

1901

*[All Rights Reserved]*

TN 450  
F2

THE following Notes were contributed to a high-class technical journal some years ago by the late James Fairie, F.G.S., a painstaking and practical geologist. The literature of this subject is limited, and it is thought that, gathered in this booklet, they will be useful to those handling Lead Ores.

## GENERAL



# NOTES ON LEAD ORES

---

## CHAPTER I

### DEFINITIONS—PROPERTIES—OCCURRENCE

THE word "lead"—like many others—recalls very dissimilar ideas of the substance it represents to the minds of those who use it. The miner, who speaks of having found "lead," uses the word for the ores of that metal; the smelter, for both the ores and their metallic product in the form of "pigs" of lead; the plumber, for the metal itself, whether in pigs or the milled or rolled sheets so extensively employed in the plumbing trade; the painter, generally for the white carbonate of lead which, mixed with oil and various metallic oxides, constitute the pigments used by him in his handicraft or art; the house or ship-chandler, the colourman, and the drysalter, for the varied products of the oxides, largely sold by them as white, yellow, orange, and red lead; the glass manufacturer, for the purified sesqui-oxide or red lead—in the native form known as *minium*—which is largely employed

in the manufacture of flint glass; and the potter uses the word alike for the white carbonate and the red sesqui-oxide of the metal, ground and purified, both of which are extensively employed for lead glazes in the manufacture of earthenware.

Lead, in its metallic form, is a well-known and probably the most anciently known of all the metals, and familiar to everyone, chiefly as used by plumbers in house-building, and for gas and water pipes and various other household appliances, or in the form of bullets and shot. Its ores are of such universal occurrence as to be found in almost every country of the globe, as, next to iron, lead is the most abundantly diffused of all the metals. In colour lead is bluish grey. It is very, and proverbially, heavy (*vide* Ex. xv. 10), its specific gravity being 11.4, or nearly  $11\frac{1}{2}$  times that of water. It is the softest of all the durable metals—its hardness being only 1.5—so that it is easily marked by the nail and cut by a knife. It is flexible, but inelastic, and therefore not sonorous; its want of elasticity makes it useful for special purposes, as for deadening a shock or for preventing a rebound; ductile and extremely malleable, so that it can be hammered into very thin sheets, which, however, from insufficient tenacity, are easily torn or split, and, what is remarkable, it does not, like other metals, acquire increase of density by hammering or rolling; indeed, it is asserted that its specific gravity is even lessened by hammering. Its tenacity is small, a wire of it one-tenth of



an inch in diameter breaking with a weight of less than 30 lbs., and it cannot be drawn into wire smaller than one-twelfth of an inch in diameter, and even to that size with difficulty—such a wire breaking with a weight of about 18 lbs. As to fusibility, it is very easily melted, more so than any other metal, except tin, its fusing point being so low as  $594^{\circ}$  Fahr.: some authorities put it at  $612^{\circ}$ , and others at  $617^{\circ}$ , however, and it may vary according to its purity. When melting and exposed to the air it shows a bright metallic lustre resembling that of mercury, but, owing to its strong affinity for oxygen, it absorbs it rapidly, and immediately tarnishes on surface, and is in a short time covered with a spongy oxide or dross; when removed from the fire it quickly solidifies again, and on this dross being scraped off, the metal acquires a slight, new coating of sub-oxide which is permanent and prevents further oxidation. If slowly cooled, it may be obtained in octahedral crystals. It is not volatile, at least in closed vessels, in which it can be heated to whiteness without subliming. At common temperatures and in dry air it tarnishes slowly, but in moist air or in water it soon becomes coated with a grey film — a hydrated sub-oxide — which, once formed, prevents further oxidation (as just mentioned), and thereby it is rendered durable when exposed to the atmosphere, and also safe for water-supply pipes and cisterns. When these are new, and before this coating of sub-oxide is formed on the surface of the lead, there is much risk of lead-

poisoning by the use of water from them, and the purer the water the greater is the danger. Spring waters, which generally contain varying percentages of carbonates, sulphates, and other salts, do not corrode lead as pure water does. Lead has little taste, but when rubbed it yields a perceptible smell. While it does not soil the fingers, it makes a faint bluish black streak on paper.

Lead is found native, but is of rare occurrence and chiefly in lava and other volcanic rocks, in which it occurs as a product of fusion. It is prized merely as a mineral curiosity for the cabinets of mineralogists, and is of no practical value whatever. Commercially, lead is wholly obtained from its ores, which are numerous, and while varying much in appearance are all easily reduced; these occur in both igneous and sedimentary rocks and formations of all ages. In the British Isles, they occur sometimes in irregular deposits or pockets, but generally in veins in mica schist, clay-slate, gneiss, granite, and limestones—chiefly of the carboniferous formation. The most abundant and best known of its ores, and from which indeed nearly the whole of the metal is obtained, is *galena*, the proto-sulphide of lead, which is the representative of the lead-glance family. Of lead salts there are no less than twenty-seven species, which, however, are of comparatively little importance commercially, but are of great mineralogical interest and often occur associated with varieties of lead-glance in more or less definite crystallised forms. Of the various ores,

besides *galena*, but a few are worked — viz. the carbonate, phosphate, sulphate, arseniate, chromate, molybdate, of lead, and its oxides, of which there are four, viz. the sub-oxide, known as *litharge*; the protoxide, called *massicot*; the sesqui-oxide *minium*, or red lead ore; and the peroxide, occurring as an insoluble brown powder. With the exception of *galena*, a few of these ores are found in sufficient quantity to be smelted alone for the lead they contain.

Lead is speedily oxidised when melted in open vessels, and passes into a grey powder, the *litharge*, which, by further exposure to heat and air, becomes yellow, and is then *massicot*, or yellow protoxide of lead. By heating this and stirring it to prevent fusion, it gradually absorbs further oxygen, and acquiring a red colour, becomes red lead — the sesqui-oxide occurring native as *minium*. This red lead heated in nitric acid is partly converted into the brown insoluble powder which is the peroxide of lead. By treating these oxides with carbonic or acetate acid, white lead, the carbonate of lead, is obtained, and also acetate of lead, commonly called “sugar of lead,” both of which are extensively used in manufactures and in the arts, and also in pharmacy.

Of the ores of lead—which are all very heavy, and are white, green, brown, yellow, or blue in colour—*galena* (from the Greek word *galeos*, to shine) is, as has been already stated, the most abundant; in fact it may, commercially speaking, be called *the ore of lead*, as it is the one from which

nearly the whole supply of the metal, both at home and abroad, is obtained. One or two of the others—especially *ceruse*, the native white carbonate of lead—are often found associated with it, but seldom in sufficient quantity to be smelted by themselves. *Galena* is the proto-sulphide of lead,  $PbS$ , its composition, when pure, being : lead, 86·6 ; sulphur, 13·4 = 100. Silver and other metals are frequently present, as shown in the following analysis, quoted by Bristow, Mott, and others, viz. :—

Lead . . . . .	80·700
Sulphur . . . . .	12·840
Antimony . . . . .	3·307
Iron . . . . .	1·377
Copper . . . . .	0·440
Zinc . . . . .	0·024
Silver . . . . .	0·325
	<hr/>
	99·013

Alumina and silica are also sometimes present in small percentages.

The colour of *galena* is lead or bluish grey, and from its brilliant metallic lustre, resembling that of fresh-cut metallic lead, it has been called *lead-glance*. Streak rather more shining than the surface of fracture. In some varieties the colour inclines to blackish lead-grey. When exposed to the action of carbonic acid in rain-water its surface is frequently found tarnished with a beautiful iridescent lustre. It is opaque ; structure, lamellar ; cleavage highly perfect and easily obtained ; sectile, frangible, and easily pulverised, but not malleable ;



hardness, 2·5 to 2·75; specific gravity, 7·25 to 7·70; B.B., it decrepitates, then melts, and emits a sulphurous odour, and when the sulphur is driven off it yields a globule of lead, from which a grain of silver may be obtained by cupellation. All lead contains a greater or less percentage of silver, varying from two or three to twenty or thirty, and even to as much as 120 ounces in the ton of lead; indeed, it has sometimes been found so rich in silver as to be worked as an ore of that metal. By Pattison's and the more recent improved zinc process it is profitable to extract the silver from lead yielding even so little as two or three ounces to the ton, and its extraction besides has the great advantage of making the lead itself less hard and brittle. It melts easily, and is melted in common reverberatory furnaces which admit of free exposure to the air during the process. It is soon brought to a red heat, by which the sulphur is driven off, and the lead ran off into moulds called "pigs." *Galena* occurs crystallised in cubes, in regular octahedrons, and in several of their modifications and varieties; and in combinations of these with the planes of other figures. Very large crystals of it have been found in the Laxey and Foxdale Mines in the Isle of Man—occasionally as much as 10 inches in diameter. It occurs also in amorphous masses with a largely curved lamellar structure; frequently granular, especially when rich in silver, and sometimes striated, when it is generally found to contain antimony; sometimes almost compact,

yielding a flat conchoidal fracture with little lustre. It is very widely distributed in most countries of the globe, and occurs both in beds and irregular deposits, and in veins of considerable extent and thickness, chiefly in clay-slate and granitic rocks, and in carboniferous limestone. It is abundant in Derbyshire and Cumberland, Yorkshire and Durham, Devonshire and Cornwall, in England; in Flintshire and many localities in Wales; and occurs in Lanarkshire and Dumfriesshire, Fifeshire and elsewhere in Scotland; and extensively in many localities in Ireland; in Spain, Portugal, Hungary, Saxony, and elsewhere in Europe; in Siberia, Algeria, Cape Colony, and Australia; and very abundantly and extensively in many parts of the United States, especially in Missouri, Illinois, Iowa, and Wisconsin. The lead region of Wisconsin alone is stated by D. D. Owen to extend eighty-seven miles from east to west, and fifty-four miles from north to south, within which immense area there is scarcely a square mile in which traces of lead ores—chiefly *galena*—may not be found; and although the pits are seldom sunk deeper than 25 or 30 feet, as much as 1335 tons of ore have been raised from a single spot not more than five yards square.

## CHAPTER II

### GALENA—CERUSSITE—MINIUM—WHITE AND RED LEADS

THERE is a variety of *galena* called "blue lead," which is pseudamorphous, after *pyromorphite*. It is found massive, and also in long, irregular, hexagonal prisms, which are superficially dull and rough. Colour, between lead-grey and indigo-blue; soft, sectile, and easily frangible; S.G., 5.4. It occurs in Cornwall in Herodsfoot's Mine, near Liskeard; also in Huel Hope. The ore from the latter ignites when held in the flame of a candle. This ore is found also in Saxony and France. Its composition is similar to that of ordinary *galena*.

In former times any largely foliated or cubical pure *galena*, occurring in a state that it could be hand-picked, and not requiring to be sent through the crushing mill, was called by the miners *potter's ore*. It was ground into a fine powder, which was dusted on the "paste" or body of such wares as were only fired once, or were not to be fired at the high temperature which biscuit ware generally requires, and which, by the melting of the powdered *galena* in the

kilns, were thus glazed. This process is not now resorted to.

There is a species of specular *galena* found chiefly in the lead mines of Derbyshire, and called locally *slickensides* ore. It is so called from its smooth, sometimes slightly furrowed, and polished appearance, resembling that of the "slickensides" in mines, which is produced by the friction that occurs in the faulting of strata in the two faces of the faults. This ore is apt to explode when struck by the miners' picks. It occurs also in some of the Devonshire lead mines, but is of no commercial importance.

*Johnstonite* is another variety of sulphide of lead. It is a fine granular supersulphide, and appears to be a mechanical mixture of *galena* and a sulphate of lead (*anglesite*) and sulphur. It occurs in the mines of New Sinka, in Transylvania, from which it has been called *sinkanite*; but having been first found at Dufton, and described by Johnstone, it was named after him by Haidinger. It occurs massive. Opaque. Colour, bluish. Lustre, metallic. H., 3; S.G., 6.7; B.B.; on charcoal burns with a blue flame, decrepitates, then melts, and leaves a globule of lead. When heated in a glass tube part of the sulphur sublimes and leaves common *galena*. Its composition is: *galena*, 98.21; sulphur, 1.79 = 100. Localities: Dufton, in Westmorland; Alston, in Cumberland; Cromford, in Derbyshire; and Glen Malure, Co. Wicklow, Ireland.



*Cerussite*.—Of the numerous ores of lead, *cerussite*, or white lead ore, is one of the most beautiful, and, next to *galena*, the most abundant. It occurs associated with that ore in beds, but more generally in veins, in almost every locality where *galena* is found, and is supposed to be a product of its decomposition—the liberated sulphuric acid of that sulphide acting on the *calcspar* in the vein matrix, and the carbonic acid of the spar combining with the ore to form *cerussite*, which is a mono-carbonate of lead; its composition being: protoxide of lead, 83·58; carbonic acid, 16·42 = 100. It is found in several beautifully crystallised forms, usually prismatic, and frequently of great delicacy; in hexagonal prisms, variously terminated; and in tabular and macled crystals. Some of its crystals are highly prized by mineralogists. Magnificent tabular crystals of it have been found at Logylas, in Cardiganshire. There is a beautiful acicular variety, the needles being either detached or united in very brilliant pearly groups. This occurs in exceedingly delicate, and often very tender snow-white crystals in Pentire Glaze Mine, and in that of St. Minver, Cornwall. There is also a columnar variety in which the prisms are striated and cross each other in all directions. Very fine crystals of it have been found at Leadhills and Wanlockhead, in Scotland, as well as in many of the richer mines in various English and Welsh counties; in heart-shaped macles at Seven Churches, Co. Wicklow, Ireland; also in the Sark Mines of the Channel Islands. Very beautiful

crystals also are found in the lead mines of Saxony, and in many other European and foreign mines; but probably the finest of all are from the mines of Gazimour, in Daouria, Siberia. *Cerussite* occurs also granular; earthy; massive and compact, rarely fibrous; sometimes in powder. One massive compact variety, of a yellowish colour, has a shining, greasy-looking fracture, and effervesces strongly in nitric acid. *Cerussite* is a very rich ore, yielding from 77 to 80 per cent. of lead; but although of so common occurrence it is — with the exceptions of the mines near Aix-la-Chapelle, Prussia, and in the neighbourhood of Santander, in Spain, where it is worked to some extent — seldom found in any quantity, and is therefore not of commercial importance, or of much interest to metallurgists or smelters. Its colour is sometimes of a brilliant white, passing oftentimes into greyish or yellowish white; sometimes smoke-grey, or greyish black. It is occasionally found tinged blue or green by salts of copper. Lustre, sometimes metallic; greasy; at times pearly; resinous on fractured surfaces, adamantine on cleavage planes. Translucent to transparent: when the latter, it is doubly refractive in a high degree. Fracture, generally small conchoidal; H., 3 to 3·5; S.G., 6·46 to 6·48; B.B., it decrepitates and becomes first red, then yellow, and lastly melts into a globule of metallic lead — the charcoal being covered with yellow fumes. It dissolves readily in dilute nitric acid. Its powder thrown on hot coals emits a phosphor-

escent light. The following is an analysis of *cerussite* from Leadhills, N.B., viz. :—

Lead . . . . .	77·0
Oxygen . . . . .	5·0
Carbonic acid . . . . .	16·0
Water. . . . .	2·0
	100·0

*Céruse* is the French name for “white lead”—the hydrated carbonate, manufactured by the corrosion of metallic lead by acetate acid (vinegar). The process is a simple, although a prolonged one, but space forbids a detailed description of it in this chapter. Suffice it to say, that plates or coils of the metal are placed in enclosed chambers under alternate layers of spent tan, in pots containing the acetate acid interspersed between them. When the chamber is closed the tan ferments, and the temperature rising to 150° Fahr. the acetate acid slowly volatilises, and its vapour, mixing with the oxygen, carbonic acid, and moisture of the air, attacks the lead and gives rise to various chemical changes. First, there is formed an oxide, then a sub-acetate, and finally the *ceruse*, a dense white hydrated carbonate of the metal. The process is continued till most of the metal is corroded on both sides—leaving an uncorroded centre or core, which is again melted for subsequent corrosion. By passing the whole under rollers the carbonate is separated from the uncorroded metal in the form of snow-white flakes or scales. These are then

ground in water and reduced by subsequent processes into a dry white powder, known commercially as white lead. It is largely used for glazes by earthenware manufacturers, and also, mixed with linseed oil, is very extensively used for house-painting, 8 lbs. of the oil being added to 1 cwt. of the white lead.

*Minium*, or red lead ore, is one of the oxides of lead occurring native, but which, like *cerussite*, is very extensively obtained artificially. It is not a very common ore, and, like the latter, being generally found associated with *galena*, is also probably a product of the decomposition of that ore. It occurs amorphous and pulverulent, exhibiting under the microscope a crystalline structure. Colour, bright red; lustre, feeble; opaque; streak, orange-yellow; H., 2.5; S.G., 4.6. Composition: lead, 90.7; oxygen, 9.3 = 100. B.B., on charcoal it is first converted into *litharge* and becomes yellow, and then is reduced to metallic lead. It occurs in the Pary's Mine in Anglesea; Snailbeach Mine, Shropshire; at Alston Moor Mines, Cumberland; Grassington Moor, Yorkshire; and at Weardale, Durham. In Scotland, at Leadhills, Lanarkshire. In Ireland, at Lugganure, Co. Wicklow; and in various foreign localities.

*Red lead* is obtained artificially by exposing *litharge* for a long time to the action of the air at a temperature of 570° Fahr., by which it is changed from a protoxide to the red oxide known commercially as red lead. It is very extensively used



as a paint or pigment. Being much used as a substitute for vermilion, its value depends greatly on its brilliancy, which depends to a considerable extent both upon its purity, and also the temperature to which it is subjected. The best quality (called *orange mine*) is made from the carbonate of lead, instead of from *litharge*, and at a higher temperature.

*Red lead* is also extensively employed by glass manufacturers in making flint glass, for which purpose it is essential that it is obtained free from impurities, such as copper or iron, otherwise the glass will have a yellow or green tinge. Like *ceruse*, it is also largely employed for glazes by earthenware manufacturers.

## CHAPTER III

PYROMORPHITE—MIMETENE—WULFENITE—  
VANADINITE

**M**INIUM, the red oxide—or, more correctly, the artificially made and purified preparation of red lead—and *ceruse*, the white hydrated carbonate of lead, are alike powerful fluxes of the ingredients with which they are mixed, and which they make more fusible both for the manufacture of flint glass and for the making of glazes for earthenware—hence their great value for both purposes. In the case of the former the red lead also imparts peculiar brilliancy and lustre to the glass. The red lead made from *litharge* differs somewhat in its properties from that which is made, as it is in some places, directly from the calcination of metallic lead, and it is said that flint glass manufacturers consider the *litharge* red lead inferior in fluxing power to that made from the metal. Red lead varies in colour according to the heat to which it is subjected in calcination. During the process it increases in weight, probably by the absorption of oxygen from the atmosphere. It may be mentioned here, that red lead can

be easily reduced by a simple process into metallic lead.

*Pyromorphite* is a phosphate, or, when it contains chlorine, which it frequently does, it is a chloro-phosphate of lead. This ore is neither a common one, nor found in any great quantity; but when it is got in sufficient quantity it is utilised by being carefully roasted with charcoal. It generally occurs in veins in primitive strata, accompanying other lead ores, especially *galena*, and in various forms, massive, globular, botryoidal, reniform, and frequently crystallised in regular six-sided prisms, truncated, or with six-sided pyramidal terminations. Colour, generally of various shades of green, yellow, and brown, also reddish, and sometimes dirty violet; but whatever its colour, its powder is always grey. Fine orange-yellow crystals of it have been found at Leadhills, N.B., containing oxide of chrome, to which that colour is owing. Streak, white, sometimes inclining to yellow. Fracture, vitreous, imperfect conchoidal, uneven, and dull. Semi-transparent to translucent on the edges. Lustre, resinous. Brittle. H., 2·75 to 4·0; S.G., 6·58 to 7·0; B.B., melts easily by itself on charcoal, and with carbonate of soda yields metallic lead; on cooling, solidifies with vivid incandescence to an angular polyhedral form of a dark colour, and at the moment of crystallisation becomes luminous—hence its name from Greek words signifying *fire-form*. It dissolves

without effervescence in hot nitric acid, giving turbidity with nitrate of silver. The following is an analysis of it from Zschopau, in Saxony, viz. :—

Oxide of lead	. . . . .	82·29
Phosphoric acid.	. . . . .	15·73
Chloric	. . . . .	1·98
Peroxide of iron.	. . . . .	trace
		<hr/>
		100·00

In England, *pyromorphite* occurs in Cornwall, Devonshire, Derbyshire, and Cumberland. In Scotland, in the Strontian Mines, Argyllshire, and at Leadhills, Lanarkshire. In Ireland, in the Glenmalure Mine, Co. Wicklow, and in Lord Londonderry's park, Co. Derry. In foreign countries it occurs chiefly in Saxony, Bohemia, the Harz, Brittany, Siberia, and Mexico.

*Mimetene* is an arseniate of lead ore, so named from a Greek word signifying "imitator," from its resemblance to *pyromorphite*, with which it often occurs mixed in varying proportions, and has, owing probably to being isomorphous with it, been sometimes confounded with that ore; its composition, however, is essentially different, containing, as it does, a considerable proportion of arsenic acid.

This is rather a rare ore, and is interesting specially to mineralogists from the remarkable beauty of some of its crystalline forms and the richness of their colouring. It ought also, how-



ever, to be so to flint-glass manufacturers, as, when used as an ingredient, it imparts a peculiar brilliancy to the glass. It is found in lead mines associated with other salts of lead, and occurs in regular six-sided prisms, either perfect, or with the terminal edges replaced, and of various shades of yellow, passing into hyacinth and aurora-red, sometimes very brilliant. The crystals are semi-transparent and occasionally finely grouped. It occurs also compact, fibrous, reniform, mammillated, filamentous, and capillary. Colour (otherwise than in crystals as above mentioned), various tints of yellow passing into brown. Lustre, resinous. Translucent usually, but occasionally transparent, when it is harder. Texture, foliated. Streak, white, or nearly so. Sectile. Brittle. Fracture, imperfect conchoidal, or uneven. H., 3·5 to 4·0; S.G., 6·41 to 7·25; B.B., on charcoal emits abundant arsenical vapours; fuses with difficulty, and yields a globule of metallic lead. Dissolves readily in nitric acid, especially if heated. The following is an analysis of it from Johanngeorgenstadt, in Saxony, viz.:—

Protoxide of lead	. . . . .	75·03
Arsenic acid	. . . . .	21·09
Phosphoric acid.	. . . . .	1·32
Chloric acid	. . . . .	2·56
		<hr/>
		100·00

In England, *mimetene* occurs in the Huel Unity Lead Mine, near Redruth, Cornwall, in thick, light

brown translucent crystals; in various lead mines in Devonshire; in Cumberland, on Caldbeck Fells, where it has been found in fine wax-yellow crystals in the Roughton Gill Mine and in the Dry Gill Mine, where it was formerly worked for the supply of flint-glass manufacturers.

It occurs also in lead mines in Durham, and at Grassiton, Yorkshire. At Leadhill Mines in Scotland many beautiful and brilliantly coloured crystals of it were formerly obtained. In foreign mines it is found in fine yellow crystals at Johannegeorgenstadt, in Saxony; in capillary crystals at St. Prix, department of the Saone, in France; also at Zinwald, Badenweiler; and at Nerchinsk, in Siberia.

*Hediphane* is a whitish variety of *mimetene*, and is a chloro-arsenate of lead containing phosphates and arseniates of lime; but it is of no importance, and found only at Longbanshytta, in Sweden. *Kampylite* is another variety, named from the barrel-shaped form of its crystals. It was formerly found in large quantities in the Dry Gill Lead Mine on Caldbeck Fells, Cumberland, but that mine has not been worked for some time now. It occurred there in crystallised masses of various colours, yellowish to brown and brownish red.

*Crocoise* or *crocoisite* is a chromate of lead, and is sometimes, from its colour, called "red lead ore," although that name is generally restricted to *minium*. This is also a very beautiful ore, and it is an exceedingly rare one. It was first discovered

in the gold mines of Berezoff, in Siberia, in a vein traversing decomposed gneiss and mica slate; but it is now but seldom found in these mines. It occurs crystallised in very distinct rhombic prisms; also in four-sided prisms striated longitudinally and with terminal pyramids; also massive. Structure, foliated; cross fracture uneven, or small conchoidal. Colour, various tints of hyacinth-red and splendid scarlet, but in powder always yellow. Streak, orange-yellow. It is used as a pigment, but the colour changes with exposure, and is not permanent. Translucent, with strong refracting power. Lustre, adamantine. Sectile. H., 2·5 to 3·8; S.G., 5·9 to 6·6; B.B., decrepitates when quickly heated, becoming darker or black. It may be fused to a black shining slag containing globules of metallic lead; gives a green colour to glass of borax; dissolves without effervescence in nitric acid, yielding a yellow solution. Composition from 64 to 68 per cent. of oxide of lead, the rest being chromic acid. An analysis by Berzelius gives oxide of lead, 68·5; chromic acid, 31·5 = 100·0. *Crocoise* occurs in very few localities in addition to the Berezoff Mines already mentioned. It occurs in fine crystals in decomposed granite at Conglionas do Campo and Villa Rica, in Brazil; at Rez Canza, in Hungary; in the Bannat; and in Luzon, one of the Philippine Islands.

*Wulfenite*, or "yellow lead ore," is a molybdate

of lead, named after the Austrian metallurgist Wulfen. It is of rare occurrence, except in crystalline forms, and is not found in sufficient quantity to be of commercial importance. It occurs in flattish octahedral or square prisms variously modified; in flat and in acute four, six, and eight-sided prisms terminated by four-sided pyramids; and in tabular octagonal crystals. Also massive—granular. Colour, dirty Isabella yellow, wax-yellow, passing into siskin-green, olive-green, brown, orange-yellow, yellowish grey, and greyish white, rarely aurora-red. Streak, white. Lustre, waxy or adamantine. Structure, lamellar. Fracture, imperfect conchoidal, or uneven. Semi-transparent to translucent on the edges. Soft. Brittle. H., 2·75 to 3·0; S.G., 5·7 to 6·9; B.B., decrepitates briskly and assumes a darker colour, which, however, disappears on cooling. Alone, or with carbonate of soda, it dissolves upon charcoal, and is absorbed by it, leaving globules of metallic lead. With borax fuses readily into an almost colourless glass. When the proportion of molybdic acid is small, the glass is green; when larger, the glass is black and opaque. Dissolves in heated nitric acid with separation of yellowish white nitrate of molybdic acid. Soluble in caustic potash; insoluble in water. Composition, 60 to 64 per cent. of protoxide of lead, the rest being molybdic acid; or, as given by another authority, protoxide of lead, 60·87; molybdic acid, 39·13 = 100·0. The following is an analysis of an impure



*wulfenite* by Hatchett, quoted by Professor Thomson, but its locality is not given, viz.:—

Protoxide of lead . . . . .	58.40
Molybdic acid . . . . .	37.00
Oxide of iron . . . . .	3.08
Silica. . . . .	0.28
Loss . . . . .	1.24
	100.00

*Wulfenite* has been found in the British Isles at Mendip, in Somersetshire. It occurs, however, in many of the lead mines in Carinthia; also in Hungary; Moldawa, in the Bannat (in red crystals resembling chromate of lead); in Austria, the Tyrol, Baden, Saxony, Dauphiny, Zimapan in Mexico, Massachusetts and Philadelphia, U.S.

*Vanadinite* is a vanadate of lead. It was discovered at Zimapan, in Mexico, and was first analysed by M. del Rio in 1804. It occurs but in few localities. About 1830 it was found at Wanlockhead, in Dumfriesshire, and shortly afterwards Professor Thomson received specimens of it from Mr. Doran, a well-known Irish mineral dealer, who had found them in an old abandoned mine in Co. Wicklow. It occurs in small spheres interspersed through massive phosphates and arseniates of lead; also in small indistinct six-sided prisms. Colour, varying from straw-yellow to reddish brown. Streak, white or yellowish. Opaque. Dull. Fracture, flat conchoidal. Lustre, resinous on fractured surfaces. Brittle. H., 2.75 to 3.0;

S.G., 6.66 to 7.23. Composition, vanadate of lead, 90.22; chloride of lead, 9.78 = 100.00. B.B., decrepitates strongly, and on charcoal fuses to a globule which yields metallic lead with emission of sparks, and the formation of a yellow film on the charcoal. Dissolves easily in nitric acid, and nitrate of silver throws down a large quantity of chloride of silver from the solution. The following is an analysis of it from Wanlockhead, viz. :—

Oxide of lead	.	.	.	.	.	.	.	66.33
Vanadic acid	.	.	.	.	.	.	.	23.44
Muriatic acid	.	.	.	.	.	.	.	2.45
Lead and loss	.	.	.	.	.	.	.	7.78
								100.00

*Vanadinite* occurs at Wanlockhead Mine, Dumfriesshire, N.B., on common and cupreous calamine. In foreign mines at Beresowsk, in Siberia, associated with phosphate of lead; at Zimapan, in Mexico, and the Zanchen, in S.E. Carinthia.

## CHAPTER IV

### PLUMBIC OCHRE—ANGLESITE—CALEDONITE— LINARITE

**B**LEIGLÄTTE, or plumbic ochre, is a protoxide of lead which occurs massive. Its existence as a separate species was first pointed out by Smithson, and it has been analysed and described by Dr. John. Geralt states that it is found among the products of the volcanoes of Popocatapell and Iztaccituell in Mexico. Colour, intermediate between sulphur and lemon-yellow. Streak, lighter. Opaque. Lustre, dull externally, but internally semi-metallic. Semi-hard. Brittle. Easily frangible. Does not soil. S.G., 8·0; B.B., on charcoal fuses readily, and is reduced to metallic lead. The following analysis of it is given by Dr. John, viz.:—

Protoxide of lead . . . . .	93·27
Carbonic acid . . . . .	3·84
Silicic acid . . . . .	2·40
Protoxide of iron and lime . . . . .	0·48
Protoxide of copper . . . . .	trace
Loss . . . . .	0·01
	100·00

This ore has not been found in the British Isles. Its only known locality, besides those above mentioned in Mexico, is at Badenweiler, in Baden.

*Anglesite*, a sulphate of lead, is derived from the decomposition of *galena*. It occurs crystallised in rhombic prisms of foliated structure with dihedral terminations, but when short the crystals assume the general form of the octahedron. It also occurs massive in lead and copper veins traversing clay-slate and greywacke. Colours, yellowish, greyish, or greenish white, also yellowish and smoke-grey, and frequently tinged green or blue by oxide of copper. Streak, white. Lustre, adamantine, inclining to vitreous or resinous. Transparent to translucent. Very brittle, and yields to the nail. Fracture, conchoidal. H., 2·75 to 3·0; S.G., 6·2 to 6·3; B.B., fuses into a white slag, which is reduced to metallic lead by the addition of carbonate of soda. Decrepitates in the flame of a candle, and frequently assumes a slightly reddish tinge on the surface. It was first observed as a distinct species at Pary's Mine in Anglesea, whence its name. The following is an analysis of it from that mine, viz.:—

Oxide of lead . . . . .	71·0
Sulphuric acid . . . . .	24·8
Peroxide of iron . . . . .	1·0
Water . . . . .	2·0
Loss . . . . .	1·2
	100·0

It occurs in brilliant crystals at Rent Tor, near



Wirksworth; in small yellow crystals at Cromford, in Derbyshire; and at the Mexico Mine near Hesketh Newmarket, in Cumberland. Large and beautiful crystals of it have been found both at Leadhills, in Lanarkshire, and at Wanlockhead, in Dumfriesshire, N.B.; and abroad, small but extremely perfect transparent crystals of it have been obtained from Fondon, in Granada.

*Caledonite*, a cupreous sulphato-carbonate of lead, was so named by Beudant from its being first found at Leadhills, in Scotland (Caledonia). It occurs in long, right rhombic prismatic crystals, and in acicular tufts of very minute crystals, radiating from their common point of attachment to the matrix. Colours, fine verdigris or bluish green, inclining to mountain-green in the more delicate crystals. Streak, greenish white. Transparent to translucent. Lustre, resinous. Rather brittle. Fracture, uneven. H., 2.5 to 3.0; S.G., 6.4; B.B., on charcoal easily reduced. Partially soluble, with slight effervescence, in nitric acid. An analysis by Brooke gives its composition as follows, viz.:—

Sulphate of lead	. . . . .	55.8
Carbonate of lead	. . . . .	32.8
Carbonate of copper	. . . . .	11.4
		<hr/>
		100.0

It occurs in flattish crystals at Leadhills, and associated with *leadhillite* and *cerussite* at Roughten Gill Mine, Caldbeck Fells, Cumberland, but nowhere

else in Great Britain. It is said to have been found abroad at Tanné, in the Hartz, and in La Motte Mine, Missouri, U.S.

*Linarite*, so named after Linares, a reputed Spanish locality of this ore, is a hydrated cupreous sulphate of lead. It occurs crystallised in oblique rhombic prisms, often in twins. Colours, deep azure blue, resembling the brightest specimens of blue carbonate of copper, the colour being evidently due to the union of water with the copper in the ore. Streak, pale blue. Lustre, vitreous or adamantine. Translucent. Brittle. Fracture, conchoidal. H., 2·5 to 3·0; S.G., 5·3 to 5·5; B.B., on charcoal, in the inner flame, yields a globule of lead, which, on continuing the heat, deposits a coating of oxide of lead. The following is an analysis of it by Professor Thomson, viz. :—

Sulphate of lead . . . . .	74·8
Oxide of copper . . . . .	19·7
Water . . . . .	5·5
	100·0

It has been found at Leadhills, Lanarkshire, in association with *cerussite*; also in the Mexico, Red Gill, and Roughten Gill Mines in Cumberland, but in no other British mines; and abroad only in the neighbourhood of Ems.

*Lanarkite* is a sulphato-carbonate of lead, first found in Lanarkshire at Leadhills—hence its name. It occurs massive, and also in thin laminæ, flexible like gypsum, and crystallised in long, slender,

right rhombic prisms, minute, and seldom distinct. Colour, greenish white or grey. Streak, white. Lustre, adamantine; on the cleavage face, pearly. Transparent to translucent. Sectile. H., 2·0 to 2·5; S.G., 6·8 to 7·0; B.B., on charcoal fuses to a globule which is white when cold and is nearly reduced to metallic lead. Effervesces slightly with nitric acid, in which it is partially soluble, leaving a residue of sulphate of lead oxide. An analysis of it by Professor Thomson gives sulphate of lead, 53·96; carbonate of lead, 46·04 = 100. In the Leadhills Mine it was found associated with *susannite* and *caledonite*, and has been found nowhere else in the British Isles. It occurs abroad at Tanné, in Brunswick; also in the Hartz, at Biberweisser in the Tyrol, and in Siberia.

*Leadhillite*, another sulphato-carbonate of lead, occurs crystallised in the form of rhombic and tabular prisms, and in foliated clusters. In composition it is a compound of sulphate and carbonate of lead in proportions forming a sulphato-tricarbon-ate. Colours, yellowish or greenish white to grey, green, yellow, and brown. Streak, white. Lustre, resinous, inclining to adamantine, pearly on cleavage planes. This pearly lustre on the cleavage face is very characteristic of *leadhillite*. Transparent to translucent. Rather brittle. Fracture, obscure conchoidal. H., 2·5; S.G., 6·2 to 6·5; B.B., intumescs and becomes yellow, but turns white again on cooling. On charcoal easily reduced to metallic lead. Effervesces briskly in nitric acid,

leaving a white residue of oxide of lead. The following is an analysis of it by Professor Thomson: sulphate of lead, 27·43; carbonate of lead, 72·57 = 100. It occurs in the Leadhill Mines, Lanarkshire, where it was first found, and after which it is named; also in the Red Gill Mine, Caldbeck Fells, Cumberland, in quartz. It has also been found abroad in the Island of Serpho in the Grecian Archipelago; and at Granada, Spain.

*Susannite*, another sulphato-carbonate of lead, is very similar to *leadhillite*, from which, however, it may be distinguished by the rhomboidal form of its crystals, and its higher specific gravity. It occurs in attached crystals on the Susanna lode of the Leadhills Mine—hence its name. It occurs there associated with *leadhillite*, *lanarkite*, and *cerussite*. Colours, pale green, yellow, grey, and dark brown. Streak, white. Transparent to opaque. Lustre, resinous, or pearly adamantine. H., 2·5; S.G., 6·55. Its composition, according to Brooke, is: sulphate of lead, 27·5; carbonate of lead, 72·5 = 100. It has been found only in Great Britain at Leadhills, N.B., and abroad at Moldawa in the Bannet, on brown iron ore and *galena*.

*Clausthalite*, a seleniate of lead, was first discovered by Zinken in 1823, at Clausthal, in the eastern Hartz. It is found there in veins of iron traversing clay-slate and green-stone, disseminated in magnesian limestone. It generally occurs massive, and with so great a resemblance to finely



grained *galena*, that it is only distinguishable from that ore by a slight but peculiar tinge of colour which characterises it. Colour, lead-grey and blue. Streak, darker than the colour. Opaque. Lustre, metallic. Fracture, granular and shining. Texture, finely granular. Rather sectile. H., 2·5 to 3·0; S.G., 7·18 to 8·80; B.B., on charcoal it is quickly decomposed, and besides the usual phenomena arising from the presence of lead, it yields the odour of decayed horse-radish, and a reddish brown substance is deposited on the charcoal. Heated in a glass tube over a spirit-lamp, the selenium almost instantly sublimes, and forms a red ring within the tube, at the open end of which its odour is very perceptible. This ore occurs massive in veins of hæmatite at Hartzgerode; also at Clausthal, Tilkerode, Zorge, and Lehrbach in the Hartz; at Reinsberg, near Freiberg, in Saxony; and in the Rio Tinto Mines, near Seville, in Spain.

*Cotunnite* is a simple chloride of lead, and was first observed by Monticelli and Covelli in the crater of Mount Vesuvius after the eruption in 1822, and was named by them in honour of one of the medical men of Naples. It was accompanied by common salt, chloride and sulphate of copper, and other salts. It was again found in 1840 soon after the eruption of 1839, in the upper crater of that volcano near the Punta del Mauro, and again in the lava flow of 1855, which ran into the Fosso della Vetrona. It occurs in very minute rhombic acicular crystals with an adamantine lustre,

inclining to silky or pearly. Colour, white. So soft, may be marked by the nail. S.G., 5·23; B.B., fuses easily, colouring the flame blue, and emitting a white vapour which is condensed on the charcoal. With soda it yields a globule of lead. Dissolves in about twenty-seven times its weight of cold water. Its composition, according to Berzelius, is: lead, 74·52; chlorine, 25·48 = 100. It has not been found in any other locality than the crater of Vesuvius.



## CHAPTER V

PLUMBO-RESINITE—CROMFORDITE—VAUQUELINITE—  
SCHÉELETINE

**M**ENDIPITE is a di-chloride of lead, and was found near Churchill, in the Mendip Hills, Somersetshire, where it occurred on earthy black oxide of manganese in crystalline masses having a fibrous and radiated columnar structure. It has been found, however, in opaque prismatic crystals at Tarnowitz in Silesia, and also in the Kunibert Mine near Briboin in Westphalia, associated with *calcespar* and *calamine*. Colour, white, sometimes with a reddish or yellowish tinge. Streak, white. Feebly translucent to opaque. Cleavage, highly perfect. Lustre, pearly on cleavage faces. H., 2·5 to 3·0; S.G., 7·077 to 7·100; B.B., decrepitates slightly when heated, and appears yellower after cooling. Fuses very readily. On charcoal is reduced with evolution of muriatic acid fumes. Easily soluble in nitric acid. Treated with peroxide of copper and bi-phosphate of soda, the flame assumes an intense blue colour. The following

is an analysis of it from Churchill by Berzelius, viz. :—

Lead . . . . .	83·20
Chloric acid . . . . .	13·77
Carbonic acid . . . . .	1·03
Silicic acid . . . . .	1·46
Water . . . . .	0·54
	<hr/>
	100·00

*Matlockite* is an oxy-chloride of lead found near Matlock, in the Cromford Mine. Primary form, a right square prism. It occurs in tabular crystals with an imperfect basal cleavage. Colour, yellowish, sometimes greenish. Lustre, adamantine, occasionally pearly on planes of cleavage. Transparent to translucent. Fracture, uneven and slightly conchoidal. H., 2·5 to 3·0; S.G., 7·21; B.B., decrepitates, and on charcoal fuses easily to a greyish yellow globule. Readily soluble in nitric acid. *Matlockite* has not been found in any other locality than the one above mentioned, near Matlock, Derbyshire, where it occurs like *cromfordite* in one of the air-shafts of the mine. Its composition is: chloride of lead, 55·5; oxide of lead, 44·5 = 100. An analysis of it by Dr. R. A. Smith gave—

Chloride of lead . . . . .	55·177
Oxide of lead . . . . .	44·300
Water . . . . .	·072
Loss . . . . .	·451
	<hr/>
	100·000

*Plumbo-resinite* is a hydrous sex-aluminate of



lead, and so named from its composition and its resemblance to gum-arabic. It resembles Muller's glass (*hyalite*) so much, except in colour, that it might be taken for it. It occurs amorphous, and in reniform, globular, or stalactitic masses with a columnar structure. Colour, yellowish or reddish brown. Translucent. Lustre, resinous. Streak, white. Fracture, conchoidal and splintery. H., 4.0 to 4.5; S.G., 6.3 to 6.4; B.B., decrepitates strongly, turns white, swells up, and fuses partially under a strong blast; on charcoal with carbonate of soda yields globules of lead. Soluble in nitric acid. The following is an analysis of it from Nussière, by Dufrenoy, viz. :—

Oxide of lead . . . . .	43.42
Chloride of lead . . . . .	2.11
Alumina . . . . .	34.23
Phosphoric acid . . . . .	1.89
Water . . . . .	16.14
Loss . . . . .	2.21
	<hr/>
	100.00

This ore has not hitherto been found in the British Isles. It occurs at Huelgoet, in Brittany, in clay-slate, and at Nussière, near Beaujeu, in France; also in La Motte Mine, Missouri, U.S.

*Cromfordite*, or, as it is sometimes called, *phosgenite*, is a chloro-carbonate of lead, and is named after the mine in which it was first discovered in its air-shaft—the Cromford Mine near Wirksworth, Matlock, Derbyshire. It occurs crystallised in

rectangular four-sided prisms, either perfect or with the lateral and also the terminal edges replaced. Colour, white, greyish or yellowish white, and pale tints of grey, yellow, and green, also bright yellow. Streak, snow-white. Transparent to translucent. Lustre, adamantine. Rather sectile and easily frangible. Fracture, conchoidal, with a splendid adamantine lustre. H., 2·75 to 3·0; S.G., 6·0 to 6·3; B.B., melts readily in the outer flame to a yellow globule, which, on cooling, becomes white and somewhat crystalline; on charcoal yields a globule of lead. Soluble, with effervescence, in nitric acid. Its composition is: chloride of lead, 51·0; carbonate of lead, 49·0 = 100·00, and by analysis—

Oxide of lead	.	.	.	.	.	.	.	80·0
Muriatic acid	.	.	.	.	.	.	.	14·0
Carbonic acid	.	.	.	.	.	.	.	6·0
								100·0

The finest crystals of *cromfordite* were obtained from the Cromford Mine, and are now in the British (Natural History) Museum. This ore has also been found in Huel Confidence, Cornwall, and occurs also in minute crystals in Lossiemouth Lead Mine at Elgin. From its chemical composition Karsten gave it the name of "corneous lead ore." It is distinguished from *cerussite* (white lead ore) by its colour, crystallisation, fracture, inferior hardness, and less specific gravity.

*Nagyagite* is a bi-telluride of lead, hitherto found only at Nagyag and Offenbanya in Transylvania, where it occurs massive, granular, but generally foliated. Its primary form is a right square prism. It is found also in very small six-sided tabular crystals with a basal cleavage. Colour, iron black to blackish lead-grey. Streak, similar. Lustre, metallic. Opaque. Highly flexible when in thin laminae. Soft, and very sectile. H., 1.0 to 1.5; S.G., 6.680 to 7.085; B.B., it melts easily on charcoal, yielding a malleable metallic button. On fusing it emits a dense vapour, colouring the flame blue, and depositing a yellow film on the charcoal; with borax it yields a bead of gold containing a little silver; dissolves in nitric acid leaving a residue of silver. In composition it is a telluride of lead and gold. The following is an analysis of it by Klaproth, viz. :—

Lead . . . . .	54.0
Tellurium . . . . .	32.2
Gold . . . . .	9.0
Copper . . . . .	1.3
Silver . . . . .	0.5
Sulphur . . . . .	3.0
	<hr/>
	100.0

*Altaitte* is a variety of bi-telluride of lead, and, as described by Rose, it appears to be much purer in composition than *nagyagite*. It occurs usually massive in granular aggregates, rarely in cubes.

Colour, tin-white with a yellow tarnish, very similar to the appearance of native antimony. Lustre, metallic. Sectile. Fracture, uneven. H., 3·0 to 3·5; S.G., 8·159 to 8·10; B.B., colours the flame blue; in the inner flame volatilises till nothing is left but a minute globule of silver. Soluble in nitric acid. It contains no gold. An analysis by Rose gives its composition as follows, viz. :—

Lead . . . . .	60·35
Tellurium . . . . .	38·37
Silver . . . . .	1·28
	100·00

Its only known locality is in Savodinsky Mine near Barnaoul in the Altai, mixed with telluric silver.

*Melanochroite* is a variety of chromate of lead which was first analysed, described, and named by Hermann. It occurs in rhombic prisms with two faces enlarged, imparting to the crystals a tabular form; also massive. Colour, between cochineal and hyacinth red; by exposure to the air it becomes lemon-yellow; powder, tile-red. Streak, brick-red. Lustre, resinous. Transparent at the edges, otherwise opaque. Soft and slightly brittle, easily reduced to powder. H., 3·0 to 3·5; S.G., 5·75; B.B., decrepitates slightly when heated and hardly yields a trace of water, becoming for the time of a darker colour. On charcoal it cracks but



does not fly off, then fuses readily to a dark-coloured mass, which becomes crystalline on cooling. In the reducing flame it yields fumes of lead, lead globules, and oxide of chromium. Fused with the fluxes it gives a green-coloured lead. Its composition by Hermann's analysis is: protoxide of lead, 76.69; chromic acid, 23.31 = 100. It occurs in veins in a limestone rock at Beresow, in the Ural, along with *galena*, *vauquelinite*, *crocoisite*, and other ores of lead.

*Vauquelinite* is a cupreo-chromate of lead, which was first observed by Berzelius as accompanying the Siberian chromate of lead, and named after the celebrated French chemist, Vauquelin. It occurs in mammillated masses forming thin crusts, and in irregularly aggregated minute and generally macled crystals. Oblique. Colour, black (occasionally with a greenish tinge), dark green, approaching olive-green and brown. Streak and powder, siskin-green or brownish. Lustre, adamantine to resinous, faint in the brown varieties. Soft enough to be scratched by the nail. Rather brittle. Fracture, uneven, dull. H., 2.5 to 3.0; S.G., 5.5 to 5.8; B.B., *per se* swells a little and melts, with much frothing, into a dark grey bead of metallic lustre with globules of metallic lead. With borax in small quantity dissolves with intumescence, and forms a green glass, which, if subjected to the action of the inner flame and then left to cool, becomes red, opaque red, or black, according to the quantity of the mineral. A large quantity of the mineral

forms a black globule with borax immediately. Soluble in nitric acid, giving a dark green solution and leaving a yellow residue. In composition it is a chromate of lead and copper. It occurs at Beresow, in Siberia, on quartz, accompanied by *crocoisite*; at Pont Gibaud in the Puy de Dôme (Auvergne); at Congonhas do Campo in Brazil, also with *crocoisite*; and in the Sing-sing Lead Mine in New York. An analysis of it from Beresow by Berzelius, gives—

Oxide of lead . . . . .	60·87
Oxide of copper . . . . .	10·80
Chromic acid . . . . .	28·33
	<hr/>
	100·00

*Schééletine* is a tungstate of lead, first subjected to a chemical examination by Breithaupt and Lampadius, and named after Scheele, the celebrated Swedish chemist. It occurs usually crystallised in four-sided prisms, with a single distinct cleavage parallel to its base. Its primary form appears to be an octahedron with a square base. It is isomorphous with both tungstate of lime and molybdate of lead. Colour, yellowish grey, brownish, or green. Streak, white. Lustre, resinous. Faintly translucent. Fracture, conchoidal and shining. H., 3·0; S.G., 7·8 to 8·1; B.B., fuses, covering the charcoal with a deposit of oxide of lead, and on cooling solidifies to a dark crystalline globule of metallic aspect, which yields a pale grey powder. With



## CHAPTER VI

DECKENITE—BLEINIERITE—BOULANGERITE—  
JAMESONITE—ZINKENITE

**P**LATTNERITE, named by Haidinger after Plattner, the Saxon chemist and metallurgist, is a somewhat doubtful species. Its composition is given as: peroxide of lead, 86·6; oxygen, 13·4 = 100. It occurs in six-sided prisms with truncated edges, and is possibly pseudo-morphous after *pyromorphite*, according to Greg and Lettsom. Colour, iron-black. Streak, brown. Opaque. Lustre, metallic adamantine. Brittle. Fracture, uneven. S.G., 9·4; B.B., on charcoal; easily reduced. It has been found at Leadhills, N.B.

*Tilkerodite*, so named by Haidinger, from its occurrence at Tilkerode, in the Hartz. It is an impure variety, owing to the presence of iron, of *clausthalite*. The analysis of the latter was accidentally omitted, viz. lead, 70·98; selenium, 28·11; cobalt, 0·83; loss, ·08 = 100, in which part of the lead is replaced by cobalt. The following is an analysis of it from Clausthal, by H. Rose, viz.:—



Lead . . . . .	57·92
Selenium . . . . .	31·42
Cobalt . . . . .	3·14
Iron . . . . .	6·45
Loss . . . . .	1·07
	<hr/>
	100·00

*Raphanosmite* is the name given by Von Koball to varieties of *clausthalite* in which a portion of the lead is replaced by copper. It is generally found in small amorphous pieces of a violet colour when newly broken, which, after exposure to the air, becomes of a variegated lead-grey and violet colour. It is soft and slightly malleable. H., 2·5 to 3·0. The following is an analysis of it from Tilkerode, in the Hartz, viz. :—

Selenium . . . . .	34·26
Lead . . . . .	47·43
Copper . . . . .	15·45
Silver . . . . .	1·29
Peroxide iron and lead . . . . .	2·08
	<hr/>
	100·51

These two varieties of *clausthalite*, as above, in which a portion of the lead is replaced by cobalt in the first, and by copper in the second, have been by Brooke and Miller named *zorgite*, from their occurrence at Zorge, in the Hartz; but such multiplication of names ought to be deprecated.

*Deckenite*, named after Dr. H. Von Decken, of Bonn, is a vanadate of lead. It occurs in small botryoidal masses. Texture, crystalline, with some

appearance of a rhombohedral cleavage. Colour, dull red, sometimes yellowish. Streak, yellow. Lustre of fresh fracture. Greasy. H., 4·0; S.G., 5·81; B.B., alone, fuses easily to a yellowish glass; with soda forms a white enamel containing grains of lead. The following is an analysis by Bergemann, viz. :—

Vanadic acid . . . . .	46·101
Oxide of lead . . . . .	53·717
Loss . . . . .	0·182
	<hr/>
	100·000

It is found in the Lauter valley, near Nieder-Schlettenbach, in Rhenish Bavaria, in variegated sandstone.

*Descloizite* is an impure and very complex vanadic-oxide of lead, the impurities consisting of zinc, copper, manganese, and iron. It has been named after Descloizeaux, the crystallographer. It occurs in South America in small rhombic crystals on a silicious and ferruginous gangue. Colour, mostly deep black, but in the smaller crystals olive, with a chatoyant-bronze lustre; light brown, inclining to red at the edges, by transmitted light; the colours zoned with straw colour, reddish brown, and black, on surfaces of fracture. H., 3·5; S.G., 5·84; B.B., fuses, and is partially reduced to a black slag investing a globule of metallic lead. Soluble in dilute nitric acid. The following is an analysis (mean of two) by Damour, viz. :—

Vanadic acid . . . . .	22·46
Oxide of lead . . . . .	54·70
	—=77·16
the remaining constituents amounting to	22·84
	<hr/> 100·00

being composed of oxides of zinc, copper, iron, and manganese, with chlorine, sand and water, etc.

*Dufrénoysite*, named after Dufrénoy, late Professor of Mineralogy, Museum of Natural History, Paris, is an arsenical sulphuret of lead. Colour, steel-grey. Streak, reddish brown. Lustre, metallic. Brittle. Fracture, uneven. S.G., 5·07 to 5·55; B.B., fuses easily, yielding sulphurous and arsenical fumes and a globule of lead. Dissolves in acids. The following analysis is by Damour, viz.:—

Lead . . . . .	56·61
Sulphur . . . . .	22·30
Arsenic . . . . .	20·87
Iron . . . . .	0·32
Copper . . . . .	0·22
Silver . . . . .	0·17
	<hr/> 100·49

It occurs at St. Gothard in small veins in dolomite with *realgar*, *orpiment*, blende, and pyrites; in the valley of Binnen in the canton of Valais, in dolomite, with *realgar*.

*Bleinierite* is a hydrous antimoniate of lead, occurring amorphous, reniform, and spheroidal; also earthy and incrusting. Colours, white, grey, yellow, and brown. Streak, white, greyish, or yellowish. Lustre, resinous. Dull or earthy.

Opaque to translucent. Structure, often curved lamellar. H., 4·0 ; S.G., 3·93 to 5·05 ; B.B., on charcoal fuses to a metallic globule, gives out antimonial fumes, and finally yields a bead of lead. The following is an analysis of it from Cornwall, by Dr. John Percy, viz. :—

Antimonious acid . . . . .	47·36
Oxide of lead . . . . .	40·73
Water . . . . .	11·91
	<hr/>
	100·00

This mineral is supposed to be a mechanical mixture, after decomposition, of lead and antimony ochres. It occurs at Nertschinsk, in Siberia ; in large detached masses in Trevinnick Mine, near Endallyon, Cornwall, with *jamesonite* and antimony ochre, where it is the result of the decomposition of the former mineral.

*Moffrasite*, so named after M. de Moffrah, attaché to the French Embassy in Madrid, is an antimonite of lead. It is a variety of *bleinierite*, composed of shelly masses forming alternate bands of brownish grey or yellowish brown colours, which differ considerably in their specific gravity. Fracture, vitreous, with somewhat brilliant lustre. H., 5·5, does not scratch glass ; S.G., of brownish bands 5·46, of yellowish 4·25 ; B.B., on charcoal, fuses, giving off white fumes, and yielding globules of lead. Dissolves in nitric acid. It occurs, forming a strong vein, at Zamora, in Spain.

*Geocronite* is a sulpho-antimonite of lead. Its name is derived from the Greek words *ge*, earth,



and *Kronos*, Saturn—the alchemistic name for lead. Its crystals are rhombic, but it usually occurs massive; also granular or earthy. Colour and streak, pale lead-grey. Lustre, metallic. Brittle. Fracture, uneven. H., 2·0 to 3·0; S.G., 6·4 to 6·6; B.B., fuses readily, giving off fumes of antimony and sulphur, and colouring the charcoal yellow. The following is an analysis of it from Meredo by Sauvage, viz. :—

Sulphur . . . . .	16·90
Antimony . . . . .	16·00
Lead . . . . .	64·89
Copper . . . . .	1·60
Loss . . . . .	0·61
	<hr/>
	100·00

It occurs in Ireland, at Kilbricken, Co. Clare; in Spain, at Meredo, in Galicia; in the Valley di Castello, near Pietro Santo, in Tuscany; and in the silver mines of Sala, in Sweden, where a portion of its antimony is replaced by arsenic.

*Kilbrichenite* is a variety of *geocronite*, which is also found at Kilbricken, and has been named by Apjohn after this, its only known locality. Colour, bluish grey. H., 2·0 to 2·5; S.G., 6·407. Dissolves slowly in warm muriatic acid. The following is an analysis of it by Apjohn, viz. :—

Sulphur . . . . .	16·36
Antimony . . . . .	14·39
Lead . . . . .	68·87
Iron . . . . .	0·38
	<hr/>
	100·00

*Schulzite* is another variety of *geocronite*, which occurs in nodules of *galena* at Meredo, in Galicia. Colour and streak, lead-grey. Opaque. Lustre, metallic. Brittle. Fracture, conchoidal, even. H., 2·5 to 3·0 ; S.G., 6·43. The following is an analysis of it by Sauvage, viz.:—

Sulphur . . . . .	16·90
Antimony . . . . .	16·00
Lead . . . . .	64·89
Copper . . . . .	1·60
Loss . . . . .	0·61
	100·00

*Boulangerite*, a sulpho-antimoniate of lead, is named after M. Boulanger, C.E. It generally occurs in plumose masses, which exhibit a crystalline structure when fractured; also granular and compact. Colour, bluish lead-grey, often spotted with yellow from oxidation. Lustre, metallic. H., 2·5 to 3·0 ; S.G., 5·75 to 6·0 ; B.B., fuses readily, giving off sulphurous acid fumes and oxide of antimony. On charcoal the presence of lead is indicated by a yellow circle. The following is an analysis of it from Molières (Gard) in France, by Boulanger, viz.:—

Sulphur . . . . .	18·5
Antimony . . . . .	25·5
Lead . . . . .	53·9
Iron . . . . .	1·2
Loss . . . . .	0·9
	100·0

It is found abundantly at Molières, in France ;

Nasafjeld, in Lapland; Wolfsberg, and, massive, acicular, and fibrous, near Bottino, in Tuscany.

*Heteromorphite*, sometimes called *feather ore*, an antimonial sulphuret of lead, differs so much from all the others, that it has been named from Greek words, signifying *another form*. It occurs in capillary forms, resembling cobwebs: also massive occasionally. Colour, between dark lead-grey and steel-grey, sometimes with an iridescent tarnish. Lustre, dull metallic. H., 1·0 to 3·0; S.G., 5·67 to 5·90. Fuses instantly in the flame of a candle with evolution of white fumes. The following is an analysis of its massive form from Wolfsberg, by Poselger, viz. :—

Sulphur . . . . .	20·32
Antimony . . . . .	32·98
Lead . . . . .	48·48
	<hr/>
	101·78

It is found at Wolfsberg, Andreasberg, and Clausthal, in the Hartz; at Freiberg; Schemnitz, near Neudorf, in Anhalt; near Bottino, in Tuscany; and at Clionta, in Peru.

*Meneghinite* is a variety of *heteromorphite* of compact fibrous forms. Very lustrous. H., 2·5. The following is an analysis of it by Bechi, viz. :—

Sulphur . . . . .	17·52
Antimony . . . . .	19·28
Lead . . . . .	59·21
Copper . . . . .	3·54
Iron . . . . .	0·34
Loss . . . . .	0·11
	<hr/>
	100·00

It occurs at Bottino, near Serravezza, in Tuscany, and is named after Professor Meneghini of Pisa.

*Jamesonite*, another sulpho-antimonite of lead, was named by Mohs after Professor Jameson of Edinburgh. Its primary form is a right rhombic prism. It occurs in acicular crystals and in fibrous masses with a columnar structure, and composed of straight and parallel or divergent particles. Colour and streak, steel-grey. Lustre, metallic. Opaque. Sectile. H., 2·0 to 2·5; S.G., 5·5 to 5·8; B.B., in an open tube gives off white fumes of oxide of antimony. On charcoal decrepitates, fuses readily, and almost entirely passes off in fumes, depositing a sublimate of oxide of lead and antimony, and leaving a ferruginous slag. Soluble in warm muriatic acid. The following is the mean of three analyses of it from Cornwall by Rose, viz. :—

Sulphur . . . . .	22·34
Antimony . . . . .	34·26
Lead . . . . .	40·00
Lead with trace of iron and zinc . . . . .	0·18
Copper . . . . .	0·14
Iron . . . . .	2·64
Loss . . . . .	0·44
	100·00

The perfect cleavage at right angles to the axis of the prisms is very characteristic of *jamesonite*, and is sufficient to distinguish it from those minerals which it otherwise resembles. It is



found in Cornwall, near Padstow; Huel Lee, near Calstock; Port Quin Cliffs and Trevinnock, near Endellion; Port Isaac, Pendogget; and abroad, in Siberia; Hungary, disseminated in *calcspar*; Spain; Brazil; and in various other countries.

*Plagionite* is a sesqui-sulpho-antimonite of lead, named, in allusion to the form of its crystals, from a Greek word signifying *oblique*. It occurs in thick tabular very oblique four-sided prisms; also massive and granular. Colour, blackish lead-grey. Opaque. Lustre, strongly metallic. Brittle. Fracture, imperfect, conchoidal. Structure, foliated. H., 2·5; S.G., 5·4; B.B., decrepitates violently, fuses easily, giving off fumes of sulphur and oxide of antimony. The following is an analysis of it from the Wolfsberg Mine by Kudernatsch, viz. :—

Sulphur . . . . .	21·49
Antimony . . . . .	37·53
Lead . . . . .	40·98
	<hr/>
	100·00

It is found at Wolfsberg, in the Hartz, on quartz, crystallised in drusy cavities in massive *plagionite*.

*Zinkenite* named by M. G. Rose in honour of Zinken, director of the mines of Anhalt, in Hanover, by whom it was discovered and first described, may be called a bisulpho-antimonite of lead; but although classed with the lead, it ought properly to be classed with the antimony ores, as that metal predominates in its composition. It occurs in regular six-sided prisms, terminated by low six-

sided pyramids. The faces of the prisms are generally deeply striated longitudinally, while those of the pyramids are uneven, but not furrowed. The crystals are generally grouped together on quartz. It occurs also massive and granular. Colour and streak, steel or dark lead-grey. Opaque. Lustre, metallic. Brittle. H., 2·5 ; S.G., 5·4 ; B.B., decrepitates violently and fuses as readily as the grey sulphuret of antimony (*stibnite*), giving off fumes of sulphur and oxide of antimony. It bears a considerable resemblance to *plagionite*, but, as the subjoined analysis shows, it differs from that species considerably :—

Sulphur . . . . .	22·58
Antimony . . . . .	44·39
Lead . . . . .	31·84
Copper . . . . .	0·42
Loss . . . . .	0·77
	100·00

It may be distinguished from both *stibnite* and *bournonite* by its different hardness and specific gravity.

The antimony mine of Wolfsberg, where Zinken first discovered it, is still the only locality where this ore has been found.

## CHAPTER VII

### BOURNONITE—NUSSIÈRITE—MIESITE—ORES CONTAINING TRACES OF LEAD

**K**OBELLITE, named after Von Kobell, is an antimonial sulpho-bismuthate of lead. It generally contains more or less impurities, such as iron, copper, etc. Colour, dark lead-grey. Streak, black. Lustre, brighter than that of grey antimony (*stibnite*). Structure, radiated. Soft. S.G., 6·29 to 6·32; B.B., fuses with strong intumescence at first, but afterwards quietly till surrounded with a yellow glass. In the inner flame fumes strongly, and yields a white metallic globule. Soluble in concentrated muriatic acid with evolution of sulphuretted hydrogen. An analysis by Sälterberg gives its composition as follows, viz. :—

Antimony . . . . .	9·24
Sulphur . . . . .	17·86
Bismuth . . . . .	27·05
Lead . . . . .	40·12
Iron . . . . .	2·96
Copper . . . . .	0·80
Matrix and loss . . . . .	1·97
	100·00

This ore is found in the cobalt mines of Sweden.

*Bournonite* is a compound ore of sulphur, lead, antimony, and copper, and is sometimes classed as a copper ore, but why so is difficult to understand, as the proportion of copper in all the analyses that have been given of it is much less than those of either antimony or lead; and as in all of them the proportion of lead is larger than that of both the copper and antimony combined, it ought to be certainly classed as a lead ore. It was first observed, at Huel Boys, in the parish of St. Endellion, Cornwall, and described, by Count de Bournon, who named it after that parish, *endellione*; but it has since been named in honour of the Count. It occurs crystallised in rectangular prisms, variously modified, in right rhomboidal prisms, and in cruciform crystals; also massive, granular, and compact. Colour and streak, steel-grey, inclining to blackish lead-grey, or iron-black. Opaque. Structure, perfectly lamellar. Fracture, uneven, or flat conchoidal, with a brilliant metallic lustre. Brittle, yields to the pressure of the nail. H., 2·5 to 3·0; S.G., 5·7 to 5·9; B.B., upon charcoal, decrepitates and melts, giving off sulphur and fumes of antimony, and yielding a black globule of lead and copper; dissolves readily in nitric acid when assisted by heat, and forms a blue solution. Analyses of it from different localities vary considerably in the proportions of its constituents, but the following analysis of it from Wolfsberg, by



Rammelsberg, is a fair average one of its composition, viz. :—

Sulphur . . . . .	19·76
Lead . . . . .	42·88
Antimony . . . . .	24·30
Copper . . . . .	13·06
	100·00

This ore is found in numerous localities. In Cornwall, at Huel Boys, in the parish of St. Endellion; at St. Merryn, near Padstow; at Nansloe, near Helstone; and Budock-Vean, near Falmouth; also in very fine, sometimes compound crystals (*wheel ore*) at Herodsfoot Mine near Liskeard. In Ireland, at Cahirglissawan, between Gort and Kenmare, Co. Kerry. In the mines of Neudorf in the Hartz, where very large crystals of it occur. Good crystals of it are also found at Kapnick in Transylvania, and at Servoz in Piedmont. It occurs also at Braunsdorf, and Gersdorf in Saxony. Other localities are at Clausthal, and Andreasberg in the Hartz. In France at Cransac, department of l'Aveyron, at Auvergne; and also in Mexico.

*Selenkupferblei*, a selen-copper-lead ore, has also, but with even less reason than in the case of *bournonite*, been classed as a copper ore, as will be evident from the subjoined analysis. It occurs massive, of a paler lead-grey colour and with a fainter lustre than in the selenide of lead

(*clausthalite*), and is often tarnished brass-yellow or violet. H., 2·5; S.G., 6·96 to 7·04; B.B., fuses with difficulty. An analysis of it by H. Rose gives its composition as—

Lead . . . . .	59·67
Copper . . . . .	7·86
Selenium . . . . .	29·96
Iron . . . . .	0·33
Iron and lead . . . . .	0·44
Waste, etc. . . . .	1·74
	100·00

This ore, and a variety of it called *selenbleikupfer*, which is composed of: lead, 47·43; copper, 15·15; selenium, 34·26; with some silver and peroxide of iron, etc., and which is very soft, somewhat malleable, and with a sp. gr. of 5·6, are varieties of *clausthalite* (in which part of the lead has been replaced by copper, but not to an extent to warrant their being classed as copper ores), and are found associated with it at Tilkerode and Zorge. They occur also at Glasbachgrund in Thuringia.

*Nussièreite*, named after the only locality in which it has as yet been found, is another compound ore of chloride and phosphate of lead and lime. It occurs in very obtuse rhombohedral crystals. Colour, yellowish, greenish or greyish, with a faint waxy lustre. H., 4·0 to 4·5; S.G., 5·041; B.B., fuses and solidifies into a whitish angular enamel; with borax forms a yellowish glass. Dissolves

readily, without effervescence, in nitric acid. The following is an analysis of it from Nussière, department of the Rhone, in France, viz. :—

Oxide of lead . . . . .	46·50
Chloride of lead . . . . .	7·65
Phosphoric acid . . . . .	19·80
Oxide of calcium . . . . .	12·30
Arsenic acid . . . . .	4·06
Protoxide of iron . . . . .	2·44
Silica and waste . . . . .	7·25
	<hr/>
	100·00

*Percylite*, a chloride or oxy-chloride of lead and copper, is named after Dr. John Percy, Professor of Metallurgical Chemistry in the Government School of Mines. It occurs in minute cubes. Colour and streak, sky-blue. Lustre, vitreous. H., 2·5; B.B., fuses rapidly; on charcoal, in the inner flame, affords metallic globules, which dissolve without residue in dilute nitric acid. The specific gravity and composition of this species has not yet been correctly ascertained.

Its only known locality is at La Sonora in Mexico, accompanying gold, in a matrix of quartz and red oxide of iron.

*Wölchite* is another compound ore of lead, copper, and antimony. It occurs in short rhombic prisms; also massive. Colour, blackish lead-grey. Brittle. Fracture, imperfect conchoidal. H., 3·0; S.G., 5·7 to 5·8.; B.B., on charcoal, fuses with effervescence to a lead-grey metallic globule, which, with soda, yields metallic copper.

The following is an analysis of it by Schrötter, viz. :—

Sulphur . . . . .	28·60
Lead . . . . .	29·90
Copper . . . . .	17·35
Antimony . . . . .	16·65
Arsenic . . . . .	6·04
Protoxide of iron . . . . .	1·40
Loss . . . . .	0·06
	<hr/>
	100·00

It occurs in the iron mines of Wölch (whence its name) or St. Gertraud, in the valley of Lavant, in Carinthia.

*Polysphærite*, a botryoidal variety of brown lead ore containing phosphate of lime, is so named from Greek words, signifying *many spheres*, owing to its occurrence only in segregations of roundish masses. Colour, brown or yellow, slightly darker than *pyromorphite*. Structure, radiated internally. Lustre, greasy. Fracture, conchoidal. S.G., 5·9 to 6·1. The following is an analysis of it by Kersten, viz. :—

Phosphate of lead . . . . .	77·02
Chloride of lead . . . . .	10·84
Phosphate of lime . . . . .	11·05
Fluoride of calcium . . . . .	1·09
	<hr/>
	100·00

Its only known localities are the mines of Sonnenwirbel and St. Nicholas, near Freiberg, in Saxony.



*Miesite* is a brown variety of *pyromorphite*, from Mies, whence its name. It is not well known, but the following analysis of it is given by Kersten, viz. :—

Phosphate of lead . . . . .	89·27
Chloride of lead . . . . .	9·66
Phosphate of lime . . . . .	0·85
Fluoride of calcium . . . . .	0·22
	100·00

Mies, in Bohemia, is as yet its only known locality.

This may close the long and interesting series of lead ores, although it by no means exhausts the ores which contain lead—not in sufficient quantity, however, to allow of their being classed as lead ores; an illustrative example of such ores may be given in one of them, viz. *plumbo-calcite*, which is a variety of *calcite* or carbonate of lime, containing varying quantities of carbonate of lead. An analysis of this ore from Wanlockhead Lead Mines in Dumfriesshire, N.B., shows it to consist of: carbonate of lime, 92·2; and carbonate of lead, 7·8; so that it would be more properly classed as a lime ore than a lead ore. There are many ores of the other metals which contain considerable percentages of lead, but these being less than their chief constituent, they are thereby excluded from the list of lead ores, as, for example, *alisonite*, a copper ore, contains: copper, 53·63; and lead, 28·25; but it is worthy of notice, that while many *lead*

*ores* contain considerable percentages of copper, *copper ores*, on the other hand, with the above exception, and excluding *bournonite*, *selenkupferbleu*, and *selenbleikupfer* (which, as has been shown, are improperly classed as copper ores) have, with two exceptions, not even a trace of lead in their composition. The two instances referred to are those of *wolfsbergite*, which contains 0·56, and *brochantite*, which contains only 0·03 per cent. of lead. It is certainly remarkable that while lead and copper are frequently found in the same mines, although in veins running in different directions, and the lead ores so often contain considerable percentages of copper, that all the various copper ores, with the solitary exception of *alisonite*, contain not even one per cent. of lead, and only in the above quoted two instances but little more than a trace of lead.

In this and the preceding chapters on lead, there are many species and varieties of its ores described, which are more or less rare. A number of them, indeed, have only been found as crystals, some of which are very beautiful and exceedingly rare. These, of course, possess great interest for mineralogists and collectors of minerals and crystals, and the rarer they are, the more eagerly are they sought for to adorn and add value to their cabinets. Apart from these, however, there are many of the species described, which, although not rare, are not found in sufficient quantity for commercial purposes, or for being separately smelted,

but being generally associated with *galena*, they are smelted with it. *Galena* is, as was mentioned in the first chapter (page 4), the chief source of supply for the production of metallic lead, but while it is so, few reflective persons who are conscious of the truth of Hamlet's words, "There are more things in heaven and earth, Horatio, than are dreamed of in your philosophy," and further believe "that through the ages one increasing purpose runs," will be disposed to question the probability, if not the certainty, that in all the varied combinations of the constituents of these ores, and the ores of the other metals also, an intelligent and wise purpose is embodied, although little thought of or realised by those through whose hands they pass. Nothing on the earth, or in it, is the result of chance, "the fortuitous concourse of atoms," but have all been created, or evolved by creative energy through the operations of laws, designed in the first place, at least, for the benefit of man; and to take one instance, as ironstone, with coal to smelt it, and limestone as a flux to facilitate that operation, are found in most localities where it exists, in close proximity, often in successive stratified deposits in the same pits; so doubtless is there a design in the presence of often apparently useless constituents in the metallic ores. Nothing is more wonderful in metallurgical processes than the results obtained by adding often very minute portions of one metal to a large portion of another, by which alloys of it are

produced possessing very different qualities from those of either of its constituents, and equally surprising results might be obtained by persevering research and experiments in the laboratories of chemical scientists, upon the varied associated constituents of metallic ores. In those described in these chapters there are in addition to the lead itself, portions of nearly all the other metals in some form or other, and percentages of many acids, salts, and earths; and new and great technical results might be achieved were chemists and metallurgists to study more in their researches and experiments the hints and indications given for their guidance in the varied combinations of constituents in those ores. In the description of *minetene* (page 18) it is pointed out that used as an ingredient in the manufacture of flint glass, it imparts a peculiar brilliancy to the glass. Exhaustive experiments would show to which ingredient or combination of ingredients this result was due, and this is but an instance which indicates what results might be obtained by such experiments on the varied ingredients of other ores.

THE END





# INDEX



Alisonite, 59.  
Altaite, 37.  
Anglesite, 26.

Bleiglätte, 25.  
Bleinierite, 45.  
Boulangerite, 48.  
Bournonite, 54, 55.  
Brochantite, 60.

Caledonite, 27, 29.  
Céruse, 13.  
Cerussite, 11, 27, 28.  
Clausthalite, 30, 42, 43.  
Cotunnite, 31.  
Crocoise, 20.  
Crocoisite, 39.  
Cromfordite, 35.

Deckenite, 43.  
Descloizite, 44.  
Dufrénoysite, 45.

Galena, 5, 10, 17, 61.  
Geocronite, 46, 47.

Hediphane, 20.  
Heteromorphite, 49.  
Hydrated sub-oxide, 3.

Jamesonite, 50.  
Johnstonite, 10.

Kampylite, 20.  
Kilbrichenite, 47.  
Kobellite, 53.

Lanarkite, 28.  
Lead glazes, 2.  
Lead ores, 2.  
Leadhillite, 27, 29.  
Linarite, 28.  
Litharge, 5, 16.

Matlockite, 34.  
Melanochrite, 38.  
Mendipite, 33.  
Meneghinite, 49.  
Miesite, 59.  
Mimetene, 18, 62.  
Minium, 1, 14, 16.  
Moffrasite, 46.

Nagyagite, 36.  
Nussièrite, 56.

Percylite, 57.  
Phosgenite, 35.  
Plagionite, 51.  
Plattnerite, 42.  
Plumbo-calcite, 59.  
Plumbo-resinite, 34.  
Polysphærite, 58.  
Pyromorphite, 9, 17, 58.

Raphanosmite, 43.

Realgar, 45.

Red lead, 15.

Schéeletine, 40.

Schulzite, 47.

Selenkupferblei, 55.

Slickensides, 10.

Stibnite, 52.

Susannite, 29.

Tilkerodite, 42.

Vanadinite, 23.

Vauquelinite, 39.

Wölchite, 57.

Wolfsbergite, 60..

Wulfenite, 21.

Zinkenite, 51.

APRIL, 1901

*This Catalogue cancels all former editions.*

The Publishers seek to issue thoroughly helpful works. These books in every instance will, they believe, be found of good value. Employers will do well to place copies of these books in the hands of the bright and promising young men in their employ, in order the better to equip them to become increasingly useful as employees. A workman who uses his brains must be preferable to one who does not *think* about his work. Brains require stimulus. These books provide that stimulus.

## A Catalogue

OF

# *Special Technical Works*

FOR

MANUFACTURERS, PROFESSIONAL MEN, STUDENTS,  
COLLEGES AND TECHNICAL SCHOOLS

BY EXPERT WRITERS

FOR THE

OIL, PAINT, COLOUR VARNISH, SOAP, CHEMICAL,  
TEXTILE, LEATHER, PAPER, COLLIERY, POTTERY,  
GLASS, PLUMBING AND DECORATING TRADES  
AND SCIENTIFIC PROFESSIONS.

---

PUBLISHED BY

## SCOTT, GREENWOOD & CO.,

TECHNICAL LITERATURE AND TRADE JOURNAL EXPERTS,

19 LUDGATE HILL, LONDON, E.C.

Tel. Address: "PRINTERIES, LONDON".

Tel. No. 5403, Bank

---

N.B.—*Full Particulars of Contents of any of the following books sent post free on application.*

Messrs. Scott, Greenwood & Co. are open to make offers for the publication of technical works.

# Books on Oils, Soaps, Colours, Glue, Varnishes, etc.

## THE PRACTICAL COMPOUNDING OF OILS, TALLOW AND GREASE FOR LUBRICATION, ETC.

By AN EXPERT OIL REFINER. 100 pp. 1898. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

Chapters I., **Introductory Remarks** on the General Nomenclature of Oils, Tallow and Greases suitable for Lubrication.—II., **Hyrocarbon Oils**.—III., **Animal and Fish Oils**.—IV., **Compound Oils**.—V., **Vegetable Oils**.—VI., **Lamp Oils**.—VII., **Engine Tallow, Solidified Oils and Petroleum Jelly**.—VIII., **Machinery Greases: Loco and Anti-friction**.—IX., **Clarifying and Utilisation of Waste Fats, Oils, Tank Bottoms, Drainings of Barrels and Drums, Pickings Up, Dregs, etc.**—X., **The Fixing and Cleaning of Oil Tanks, etc.**—Appendix and General Information.

### Press Opinions.

"This work is written from the standpoint of the oil trade, but its perusal will be found very useful by users of machinery and all who have to do with lubricants in any way."—*Colliery Guardian*.

"The properties of the different grades of mineral oil and of the animal and vegetable non-drying oils are carefully described, and the author justly insists that the peculiarities of the machinery on which the lubricants are to be employed must be considered almost before everything else. . . . The chapters on grease and solidified oils, etc., are excellent."—*The Ironmonger*.

"In its ninety-six pages this little work contains a wealth of information; it is written without waste of words on theoretical matters, and contains numerous formulas for a great variety of compounds for the most varied lubricants. In addition there are many practical hints of use in the factory in general, such as of tanks, etc., and altogether the book is worth several times its price in any factory of these compounds."—*American Soap Journal*.

**SOAPS.** A Practical Manual of the Manufacture of Domestic, Toilet and other Soaps. By GEORGE H. HURST, F.C.S. Illustrated with Sixty-six Engravings. 390 pp. 1898. Price 12s. 6d.; India and Colonies, 13s. 6d.; Other Countries, 15s.; strictly net, post free.

### Contents.

Chapters I., **Introductory**.—II., **Soap-maker's Alkalies**.—III., **Soap Fats and Oils**.—IV., **Perfumes**.—V., **Water as a Soap Material**.—VI., **Soap Machinery**.—VII., **Technology of Soap-making**.—VIII., **Glycerine in Soap Lyes**.—IX., **Laying out a Soap Factory**.—X., **Soap Analysis**.—Appendices.

### Press Opinions.

"We think it is the most practical book on these subjects that has come to us from England so far."—*American Soap Journal*.

"Much useful information is conveyed in a convenient and trustworthy manner which will appeal to practical soap-makers."—*Chemical Trade Journal*.

"Works that deal with manufacturing processes, and applied chemistry in particular, are always welcome. Especially is this the case when the material presented is so up-to-date as we find it here."—*Bradford Observer*.

"The best and most reliable methods of analysis are fully discussed, and form a valuable source of reference to any works' chemist. . . . Our verdict is a capitably produced book, and one that is badly needed."—*Birmingham Post*.

"This is a better book on soap-manufacture than any of the same size which have been published for some time. It reads like the 'real thing,' and gives a very complete account of the technique of soap-making, especially of the machinery employed, the different methods and even the arrangement of soap factories. . . . The book is produced well, and is splendidly illustrated."—*Chemist and Druggist*.

**ANIMAL FATS AND OILS:** Their Practical Production, Purification and Uses for a great Variety of Purposes. Their Properties, Falsification and Examination. A Handbook for Manufacturers of Oil and Fat Products, Soap and Candle Makers, Agriculturists, Tanners, Margarine Manufacturers, etc., etc. By LOUIS EDGAR ANDÉS. With Sixty-two Illustrations. 240 pp. 1898. Price 10s. 6d.; India and Colonies, 11s.; Other Countries, 12s.; strictly net, post free.



## Contents.

Introduction. Occurrence, Origin, Properties and Chemical Constitution of Animal Fats. Preparation of Animal Fats and Oils. Machinery. Tallow-melting Plant. Extraction Plant. Presses. Filtering Apparatus. Butter: Raw Material and Preparation, Properties, Adulterations, Beef Lard or Remelted Butter, Testing. Candle-fish Oil. Mutton-Tallow. Hare Fat. Goose Fat. Neatsfoot Oil. Bone Fat: Bone Boiling, Steaming Bones, Extraction, Refining. Bone Oil. Artificial Butter: Oleomargarine, Margarine Manufacture in France, Grasso's Process, "Kaiser's Butter," Jahr & Münzberg's Method, Filbert's Process, Winter's Method. Human Fat. Horse Fat. Beef Marrow. Turtle Oil. Hog's Lard: Raw Material, Preparation, Properties, Adulterations, Examination. Lard Oil. Fish Oils. Liver Oils. Artificial Train Oil. Wool Fat: Properties, Purified Wool Fat. Spermaceti: Examination of Fats and Oils in General.

### Press Opinions.

"The descriptions of technical processes are clear, and the book is well illustrated and should prove useful."—*Manchester Guardian*.

"It is a valuable work, not only for the student, but also for the practical manufacturer of oil and fat products."—*Journal of the American Chemical Society*.

"The work is very fully illustrated, and the style throughout is in strong contrast to that employed in many such treatises, being simple and clear."—*Shoe and Leather Record*.

"An important handbook for the 'fat industry,' now a large one. The explanation of the most scientific processes of production lose nothing of their clearness in the translation."—*Newcastle Chronicle*.

"The latest and most improved forms of machinery are in all cases indicated, and the many advances which have been made during the past years in the methods of producing the more common animal fats—lard, tallow and butter—receive due attention."—*Glasgow Herald*.

**VEGETABLE FATS AND OILS: Their Practical Preparation, Purification and Employment for Various Purposes, their Properties, Adulteration and Examination.** A Handbook for Oil Manufacturers and Refiners, Candle, Soap and Lubricating Oil Makers, and the Oil and Fat Industry in General. Translated from the German of LOUIS EDGAR ANDÉS. With Ninety-four Illustrations. 320 pp. 1897. Price 10s. 6d.; India and Colonies, 11s.; Other Countries, 12s.; strictly net, post free.

### Contents.

Statistical Data. General Properties of the Vegetable Fats and Oils. Estimation of the Amount of Oil in Seeds. Table of Vegetable Fats and Oils, with French and German Nomenclature, Source and Origin and Percentage of Fat in the Plants from which they are Derived. The Preparation of Vegetable Fats and Oils: Storing Oil Seeds; Cleaning the Seed. Apparatus for Grinding Oil Seeds and Fruits. Installation of Oil and Fat Works. Extraction Method of Obtaining Oils and Fats. Oil Extraction Installations. Press Moulds. Non-drying Vegetable Oils. Vegetable drying Oils. Solid Vegetable Fats. Fruits Yielding Oils and Fats. Wool-softening Oils. Soluble Oils. Treatment of the Oil after Leaving the Press. Improved Methods of Refining with Sulphuric Acid and Zinc Oxide or Lead Oxide. Refining with Caustic Alkalies, Ammonia, Carbonates of the Alkalies, Lime. Bleaching Fats and Oils. Practical Experiments on the Treatment of Oils with regard to Refining and Bleaching. Testing Oils and Fats.

### Press Opinions.

"Concerning that and all else within the wide and comprehensive connection involved this book must be invaluable to every one directly or indirectly interested in the matters it treats of."—*Commerce*.

"The proprietors of the *Oil and Colourman's Journal* have not only placed a valuable and highly interesting book of reference in the hands of the fats and oils industry in general, but have rendered no slight service to experimental and manufacturing chemists."—*Manufacturing Chemist*.

**IRON - CORROSION, ANTI - FOULING AND ANTI-CORROSIVE PAINTS.** By LOUIS EDGAR ANDÉS. Sixty-two Illustrations. 275 pp. Translated from the German. 1900. Price 10s. 6d.; India and Colonies, 11s.; Other Countries, 12s.; strictly net, post free.

### Contents.

Ironrust and its Formation—Protection from Rusting by Paint—Grounding the Iron with Linseed Oil, etc.—Testing Paints—Use of Tar for Painting on Iron—Anti-corrosive Paints—Linseed Varnish—Chinese Wood Oil—Lead Pigments—Iron Pigments—Artificial Iron Oxides—Carbon—Preparation of Anti-corrosive Paints—Results of Examination of Several Anti-corrosive Paints—Paints for Ship's Bottoms—Anti-fouling Compositions—Various Anti-corrosive and Ship's Paints—Official Standard Specifications for Ironwork Paints—Index.

## Press Opinions.

"This is a very valuable book, translated from the German, discussing in detail anti-fouling and anti-corrosive paints."—*British Mercury*.

"Will be of great service to paint manufacturers, engineering contractors, ironfounders, shipbuilders and others."—*Engineer and Iron Trades Advertiser*.

"The book before us deals with the subject in a manner at once practical and scientific, and is well worthy of the attention of all builders, architects and engineers."—*The Builder*.

"The book is very readable and full of valuable information, and bearing in mind the importance of the subject treated, it is one which engineers will be well advised to procure at an early date."—*Railway Engineer*.

"The author goes fully into his subject, and the translator has been successful in reproducing in another language what he has to say. There are given in the text numerous illustrations of the rusting of iron, prepared in the course of a series of personal experiments on the formation of rust."—*Journal of Gas Lighting*.

"This work is a very elaborate and useful record of the various phenomena in connection with the corrosion of iron and its protection against corrosion. . . . The book is an exceedingly useful record of what has been done in connection with iron preservation, and will undoubtedly prove to be of much value to railway engineers, shipowners, etc."—*Fairplay*.

"Herr Andès' book, written purely from a scientific standpoint, will be particularly useful to iron manufacturers, shipbuilders and shipowners. . . . The book is beautifully printed on good paper, and its appearance does credit to the publishers; the work of translation has been remarkably well done, the language bearing none of those irritating traces of Teutonism which disfigure so many English versions of German technical works."—*The Ironmonger*.

"This knowledge is conveyed with characteristic German thoroughness in this useful work of Herr Andès, which loses nothing of clearness in Mr. Salter's excellent translation. The causes of rust formation are examined, the proper methods of cleansing the ironwork detailed, and the constitution and application of suitable preventative coverings explained. . . . The book is a welcome contribution to technological literature, and will be found worthy of the careful study of all who are professionally engaged in the arrangement or superintendence of the class of work dealt with."—*Western Daily Mercury*.

"The author explains the nature of rust and its formation, and the text is illustrated from about fifty photographs. An immense amount of carefully arranged information follows as to the best methods of applying anti-corrosive substances and the various pigments most efficacious for use under all circumstances. The author has evidently thoroughly investigated and mastered the subject of iron corrosion, its cause and its prevention; and we regard his book as of the greatest importance to bridge-builders and makers and users of structural iron and steel. The book is illustrated throughout and is admirably indexed and arranged."—*Iron and Steel Trades Journal*.

"It is of the utmost importance to have reliable information on the various so-called infallible anti-corrosive paints which flood the market, and the large experience which evidently had been gained by the author in relation to the subject enables him to present in the work under notice an important contribution towards the solution of the problem involved, which is bound to prove extremely serviceable not only to paint manufacturers, but to engineers, contractors, ironfounders, shipbuilders and others. The subject is thoroughly dealt with in all its various phases, and the vast fund of information afforded not only regarding rust formation and its prevention, but in reference to paints, varnishes, oils and pigments generally, should prove very valuable to the large class interested, while additional importance is given to the book by the numerous illustrations which were prepared by the author in the course of a series of personal experiments on the formation of rust."—*Builders' Reporter*.

## THE MANUFACTURE OF ALUM AND THE SULPHATES AND OTHER SALTS OF ALUMINA AND IRON. Their Uses and Applications as Mordants in Dyeing and Calico Printing, and their other Applications in the Arts, Manufactures, Sanitary Engineering, Agriculture and Horticulture.

### Contents.

- Part I., **Theoretical Study of Aluminium, Iron, and Compounds of these Metals.**  
—Chapters I., Aluminium and its Compounds.—II., Iron and Iron Compounds.
- Part II., **Manufacture of Aluminium Sulphates and Sulphates of Iron.**—Chapters III., Manufacture of Aluminium Sulphate and the Alums.—IV., Manufacture of Sulphates of Iron.
- Part III., **Uses of the Sulphates of Aluminium and Iron.**—Chapters V., Uses of Aluminium Sulphate and Alums—Application to Wool and Silk—Preparing and using Aluminium Acetates—Employment of Aluminium Sulphate in Carbonising Wool—The Manufacture of Lake Pigments—Manufacture of Prussian Blue—Hide and Leather Industry—Paper Making—Hardening Plaster—Lime Washes—Preparation of Non-inflammable Wood, etc.—Purification of Waste Waters.—VI., **Uses and Applications of Ferrous Sulphate and Ferric**



**Sulphates.**—Dyeing—Manufacture of Pigments—Writing Inks—Purification of Lighting Gas—Agriculture—Cotton Dyeing—Disinfectant—Purifying Waste Liquors—Manufacture of Nordhausen Sulphuric Acid—Fertilising.

Part IV., **Chemical Characteristics of Iron and Aluminium.**—Analysis of Various Aluminous or Ferruginous Products.—Chapter VII., Aluminium.

**LUBRICATING OILS, FATS AND GREASES:** Their Origin, Preparation, Properties, Uses and Analyses. A Handbook for Oil Manufacturers, Refiners and Merchants, and the Oil and Fat Industry in General. By GEORGE H. HURST, F.C.S. Sixty-five Illustrations. 313 pp. 1896. Price 10s. 6d.; India and Colonies, 11s.; Other Countries, 12s.; strictly net, post free.

### Contents.

Chapters I., **Introductory.** Oils and Fats, Fatty Oils and Fats, Hydrocarbon Oils, Uses of Oils.—II., **Hydrocarbon Oils.** Distillation, Simple Distillation, Destructive Distillation, Products of Distillation, Hydrocarbons, Paraffins, Olefins, Napthenes.—III., **Scotch Shale Oils.** Scotch Shales, Distillation of Scotch Oils, Shale Retorts, Products of Distilling Shales, Separating-Products, Treating Crude Shale Oil, Refining Shale Oil, Shale Oil Stills, Shale Naphtha Burning Oils, Lubricating Oils, Wax.—IV., **Petroleum.** Occurrence, Geology, Origin, Composition, Extraction, Refining, Petroleum Stills, Petroleum Products, Cylinder Oils, Russian Petroleum, Deblooming Mineral Oils.—V., **Vegetable and Animal Oils.** Introduction, Chemical Composition of Oils and Fats, Fatty Acids, Glycerine, Extraction of Animal and Vegetable Fats and Oils, Animal Oils, Vegetable Oils, Rendering, Pressing, Refining, Bleaching, Tallow, Tallow Oil, Lard Oil, Neatsfoot Oil, Palm Oil, Palm Nut Oil, Coconut Oil, Castor Oil, Olive Oil, Rape and Colza Oils, Arachis Oil, Niger Seed Oil, Sperm Oils, Whale Oil, Seal Oil, Brown Oils, Lardine, Thickened Rape Oil.—VI., **Testing and Adulteration of Oils.** Specific Gravity, Alkali Tests, Sulphuric Acid Tests, Free Acids in Oils, Viscosity Tests, Flash and Fire Tests, Evaporation Tests, Iodine and Bromide Tests, Elaidin Test, Melting Point of Fat, Testing Machines.—VII., **Lubricating Greases.** Rosin Oil, Anthracene Oil, Making Greases, Testing and Analysis of Greases.—VIII., **Lubrication.** Friction and Lubrication, Lubricant, Lubrication of Ordinary Machinery, Spontaneous Combustion of Oils, Stainless Oils, Lubrication of Engine Cylinders, Cylinder Oils.—**Appendices.** A. Table of Baume's Hydrometer—B. Table of Thermometric Degrees—C. Table of Specific Gravities of Oils—**Index.**

### Press Opinions.

"The book is well printed, and is a credit alike to author, printer and publisher."—*Textile Mercury.*

"It will be a valuable addition to the technical library of every steam user's establishment."—*Machinery Market.*

"Mr. Hurst has in this work supplied a practical treatise which should prove of especial value to oil dealers, and also, though in a less degree, to oil users."—*Textile Manufacturer.*

"This is a clear and concise treatment of the method of manufacturing and refining lubricating oils. . . . The book is one which is well worthy the attention of readers who are users of oil."—*Textile Recorder.*

"We have no hesitation in saying that in our opinion this book ought to be very useful to all those who are interested in oils, whether as manufacturers or users of lubricants, or to those chemists or engineers whose duty it may be to report upon the suitability of the same for any particular class of work."—*Engineer.*

"The author is widely known and highly respected as an authority on the chemistry of oils and the technics of lubrication, and it is safe to say that no work of similar interest or equal value to the general oil-selling and consuming public has heretofore appeared in the English language."—*Drugs, Oils and Paints, U.S.A.*

"This valuable and useful work, which is both scientific and practical, has been written with a view of supplying those who deal in and use oils, etc., for the purpose of lubrication, with some information respecting the special properties of the various products which cause these various oils to be of value as lubricants."—*Industries and Iron.*

"A mere glance at the table of contents is sufficient to show how various are the conditions to which these materials have to be applied, how much knowledge is required for the selection of the right kind for each particular purpose, and how by processes of mixture or manufacture the requisite qualities are obtained in each case."—*Manchester Guardian.*

**THE MANUFACTURE OF VARNISHES, OIL REFINING AND BOILING, AND KINDRED INDUSTRIES.** Describing the Manufacture of Spirit Varnishes and Oil Varnishes; Raw Materials: Resins, Solvents and Colouring Principles; Drying Oils: their Properties, Applications and Preparation by both Hot and Cold Processes; Manufacture, Employment and Testing of Different Varnishes. Translated from the French of ACH. LIVACHE, Ingénieur Civil des Mines. Greatly Extended and Adapted to English Practice, with numerous Original Recipes. By JOHN GEDDES MCINTOSH, Lecturer on Oils, Colours and Varnishes, Regent Street Polytechnic. Twenty-seven Illustrations. 400 pp. 1899. Price 12s. 6d.; India and Colonies, 13s. 6d.; Other Countries, 15s.; strictly net, post free.

### Contents.

I. Resins: Gum Resins, Oleo Resins and Balsams, Commercial Varieties, Source, Collection, Characteristics, Chemical Properties, Physical Properties, Hardness, Adulterations, Appropriate Solvents, Special Treatment, Special Use.—II. Solvents: Natural, Artificial, Manufacture, Storage, Special Use.—III. Colouring: Principles, (1) Vegetable, (2) Coal Tar, (3) Coloured Resinates, (4) Coloured Oleates and Linoleates.—Gum Running: Furnaces, Bridges, Flues, Chimney Shafts, Melting Pots, Condensers, Boiling or Mixing Pans, Copper Vessels, Iron Vessels (Cast), Iron Vessels (Wrought), Iron Vessels (Silvered), Iron Vessels (Enamelled), Steam Superheated Plant, Hot-air Plant.—Spirit Varnish Manufacture: Cold Solution Plant, Mechanical Agitators, Hot Solution Plant, Jacketted Pans, Mechanical Agitators, Clarification and Filtration, Bleaching Plant, Storage Plant.—Manufacture, Characteristics and Uses of the Spirit Varnishes yielded by: Amber, Copal, Dammar, Shellac, Mastic, Sandarac, Rosin, Asphalt, India Rubber, Gutta Percha, Collodion, Celluloid, Resinates, Oleates.—Manufacture of Varnish Stains.—Manufacture of Lacquers.—Manufacture of Spirit Enamels.—Analysis of Spirit Varnishes.—Physical and Chemical Constants of Resins.—Table of Solubility of Resins in different Menstrua.—Systematic qualitative Analysis of Resins, Hirschop's tables.—Drying Oils: Oil Crushing Plant, Oil Extraction Plant, Individual Oils, Special Treatment of Linseed Oil, Poppyseed Oil, Walnut Oil, Hempseed Oil, Llamantia Oil, Japanese Wood Oil, Gurjun Balsam, Climatic Influence on Seed and Oil.—Oil Refining Processes, Thenard's, Liebig's, Filtration, Storage, Old Tanked Oil.—Oil Boiling: Fire Boiling Plant, Steam Boiling Plant, Hot-Air Plant, Air Pumps, Mechanical Agitators, Vincent's Process, Hadfield's Patent, Storer's Patent, Walton's Processes, Continental Processes, Pale Boiled Oil, Double Boiled Oil, Hartley and Blenkinsop's Process.—Driers: Manufacture, Special Individual Use of (1) Litharge, (2) Sugar of Lead, (3) Red Lead, (4) Lead Borate, (5) Lead Linoleate, (6) Lead Resinate, (7) Black Oxide of Manganese, (8) Manganese Acetate, (9) Manganese Borate, (10) Manganese Resinate, (11) Manganese Linoleate, Mixed Resinates and Linoleates, Manganese and Lead, Zinc Sulphate, Terebine, Liquid Driers.—Solidified Boiled Oil.—Manufacture of Linoleum.—Manufacture of India Rubber Substitutes.—Printing Ink Manufacture—Lithographic Ink Manufacture.—Manufacture of Oil Varnishes.—Running and Special Treatment of Amber, Copal, Kauri, Manilla.—Addition of Oil to Resin.—Addition of Resin to Oil.—Mixed Processes.—Solution in Cold of previously Fused Resin.—Dissolving Resins in Oil, etc., under pressure.—Filtration.—Clarification.—Storage.—Ageing.—Coach-makers' Varnishes and Japans.—Oak Varnishes.—Japanners' Stoving Varnishes.—Japanners' Gold Size.—Brunswick Black.—Various Oil Varnishes.—Oil-Varnish Stains.—Varnishes for "Enamels".—India Rubber Varnishes.—Varnishes Analysis: Processes, Matching.—Faults in Varnishes: Cause, Prevention.—Experiments and Exercises.

### Press Opinions.

"There is no question that this is a useful book."—*Chemist and Druggist*.

"The different formulæ which are quoted appear to be far more 'practical' than such as are usually to be found in text-books; and assuming that the original was published two or three years ago, and was only slightly behindhand in its information, the present volume gives a fair insight into the position of the varnish industry."—*The Ironmonger*.

### Letter from the Teacher of a Technical Class.

"As a teacher I have often been consulted as to the best work on Varnish Manufacture and kindred industries, and have been at a loss in recommending a really practical one. It is therefore with pleasure that I can now testify as to the merits of the book on these subjects by A. Livache and J. G. McIntosh recently published by Messrs. Scott, Greenwood & Co. In my opinion no varnish maker ought to be without it; moreover, it is the best text-book that could be put into the hands of trade students or beginners. It has also the merits of being thoroughly up-to-date and of possessing a remarkably comprehensive index. I can conscientiously recommend it to my students and trade friends."—CHARLES HARRISON, Lecturer on the Manufacture of Painters' Oils, Colours and Varnishes, Borough Polytechnic, Borough Road, S.E.

"23rd May, 1890"



## THE MANUFACTURE OF LAKE PIGMENTS FROM ARTIFICIAL COLOURS.

By FRANCIS H. JENNISON, F.I.C., F.C.S. Sixteen Coloured Plates, showing Specimens of Eighty-nine Colours, specially prepared from the Recipes given in the Book. 136 pp. 1900. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

Chapters I., Introduction.—II., The Groups of the Artificial Colouring Matters.—III., The Nature and Manipulation of Artificial Colours.—IV., Lake-forming Bodies for Acid Colours.—V., Lake-forming Bodies' Basic Colours.—VI., Lake Bases.—VII., The Principles of Lake Formation.—VIII., Red Lakes.—IX., Orange, Yellow, Green, Blue, Violet and Black Lakes.—X., The Production of Insoluble Azo Colours in the Form of Pigments.—XI., The General Properties of Lakes Produced from Artificial Colours.—XII., Washing, Filtering and Finishing.—XIII., Matching and Testing Lake Pigments.—Index.

### Press Opinions.

"It is evidently the result of prolonged research, and cannot but prove a valuable consulting work to those engaged in the industry."—*Derby Mercury*.

"The book is well written and full of just such information as will enable a young man to put 'brains' into his work. The various classes of colouring matters are carefully described and the process by which the lakes are produced fully discussed."—*Northern Daily Telegraph*.

"This work just issued is a very valuable treatise on the manufacture of lake pigments of the coal-tar series principally. The plan adopted by the author in writing up the subject enables the manufacture to be very readily understood. . . . The general properties of lakes produced from artificial colours, washing, filtering and finishing, and matching and testing lake pigments are well and exhaustively described, so that no manufacturer or user of lake pigments can well afford to be without this work."—*Chemical Trade Journal*.

"This is undoubtedly a book which will occupy a very high place amongst technical works, and will prove of exceptional value to all whom it immediately concerns. We have no hesitation in recommending it as one of the best works of its class we have ever read. Mr. Jennison has set about his task with a lucid style, and with a complete mastery of his subject. . . . We do not think students of the technical side of the paint and colour industry can possibly spend 7s. 6d. in a more profitable way than by buying this publication."—*Eastern Morning News*.

## THE TESTING AND VALUATION OF RAW MATERIALS USED IN PAINT AND COLOUR MANUFACTURE.

By M. W. JONES, F.C.S. A Book for the Laboratories of Colour Works. 88 pp. 1900. Price 5s.; India and Colonies, 5s. 6d.; Other Countries, 6s.; strictly net, post free.

### Contents.

Aluminium Compounds. China Clay. Iron Compounds. Potassium Compounds. Sodium Compounds. Ammonium Hydrate. Acids. Chromium Compounds. Tin Compounds. Copper Compounds. Lead Compounds. Zinc Compounds. Manganese Compounds. Arsenic Compounds. Antimony Compounds. Calcium Compounds. Barium Compounds. Cadmium Compounds. Mercury Compounds. Ultramarine. Cobalt and Carbon Compounds. Oils Index.

### Press Opinions.

"Though this excellent little work can appeal only to a limited class, the chemists in colour works, yet it will appeal to them very strongly indeed, for it will put them on the track of short, rapid, and yet approximately, accurate methods of testing the comparative value of competing samples of raw material used in paint and colour manufacture."—*North British Daily Mail*.

"This little text-book is intended to supplement the larger and more comprehensive works on the subject, and it embodies the result of Mr. Jones' experiments and experiences, extending over a long period. It gives, under separate headings, the principal ingredients and impurities found in the raw materials, and is a handy work of reference for ascertaining what is valuable or detrimental in the sample under examination."—*Blackburn Times*.

"There is no attempt at literary adornment nor straining after literary effect, but the lessons are imparted in simple and concise language. This is just what a text-book should be. . . . The treatise is certainly most useful, and bears internal evidence of being the results of actual work in a busy manufactory and not of ephemeral cramming in a technical school. The chapter arrangement is good, the index satisfactory, and the book is altogether one which the practical chemist should keep as accessible to his crucibles and filter paper."—*Manchester Courier*.

**THE CHEMISTRY OF ESSENTIAL OILS AND ARTIFICIAL PERFUMES.** By ERNEST J. PARRY, B.Sc. (Lond.), F.I.C., F.C.S. Illustrated with Twenty Engravings. 400 pp. 1899. Price 12s. 6d.; India and Colonies, 13s. 6d.; Other Countries, 15s.; strictly net, post free.

### Contents.

Chapters I., The General Properties of Essential Oils.—II., Compounds occurring in Essential Oils.—III., The Preparation of Essential Oils.—IV., The Analysis of Essential Oils.—V., Systematic Study of the Essential Oils.—VI., Terpeneless Oils.—VII., The Chemistry of Artificial Perfumes.—Appendix: Table of Constants.

### Press Opinions.

"There can be no doubt that the publication will take a high place in the list of scientific text-books."—*London Argus*.

"We can heartily recommend this volume to all interested in the subject of essential oils from the scientific or the commercial standpoint."—*British and Colonial Druggist*.

"Mr. Parry has done good service in carefully collecting and marshalling the results of the numerous researches published in various parts of the world."—*Pharmaceutical Journal*.

"A most useful appendix is inserted, giving a table of constants for the more important essential oils. . . . This, in itself, is of sufficient importance and use to warrant the publication of the book, and, added to the very complete classification and consideration of the essential oils which precedes it, the volume becomes of great value to all interested."—*Glasgow Herald*.

"At various times monographs have been printed by individual workers, but it may safely be said that Mr. Parry is the first in these latter days to deal with the subject in an adequate manner. His book is well conceived and well written. . . . He is known to have sound practical experience in analytical methods, and he has apparently taken pains to make himself *au fait* with the commercial aspects of the subject."—*Chemist and Druggist*.

"Mr. Parry's reputation as a scientist is fully established, and we can therefore accept any work emanating from his pen as being of the greatest practical value. We have perused the work before us with much care, and are convinced that the contents will be found most serviceable and its publication most opportune. . . . He avoids unnecessary details, but includes everything that is essential to systematic treatment, while he attempts no more 'than to give an outline of the principles involved'. . . . We congratulate Mr. Parry on the scientific value of his work, and hope that if the progress of the colonies in the manufacture of essential oils and perfumes equals what we are justified in expecting, it will become an Australian hand-book, everywhere appreciated."—*The Australian Brewers' Journal*.

**DRYING OILS, BOILED OIL AND SOLID AND LIQUID DRIERS.** By L. E. ANDÉS. A Practical Work for Manufacturers of Oils, Varnishes, Printing Inks, Oilcloth and Linoleum, Oilcakes, Paints, etc. Expressly Written for this Series of Special Technical Books, and the Publishers hold the Copyright for English and Foreign Editions. Forty-two Illustrations. 360 pp. 1901. Demy 8vo. Price 12s. 6d.; India and Colonies, 13s. 6d.; Other Countries, 15s.

### Contents.

Chapters I., General Chemical and Physical Properties of the Drying Oils; Cause of the Drying Property; Absorption of Oxygen; Behaviour towards Metallic Oxides, etc.—II., The Properties of and Methods for obtaining the Drying Oils.—III., Production of the Drying Oils by Expression and Extraction; Refining and Bleaching; Oil Cakes and Meal; The Refining and Bleaching of the Drying Oils; The Bleaching of Linseed Oil.—IV., The Manufacture of Boiled Oil; The Preparation of Drying Oils for Use in the Grinding of Paints and Artists' Colours and in the Manufacture of Varnishes by Heating over a Fire or by Steam, by the Cold Process, by the Action of Air, and by Means of the Electric Current; The Driers used in Boiling Linseed Oil; The Manufacture of Boiled Oil and the Apparatus therefor; Livache's Process for Preparing a Good Drying Oil and its Practical Application.—V., The Preparation of Varnishes for Letterpress, Lithographic and Copperplate Printing, for Oilcloth and Waterproof Fabrics; The Manufacture of Thickened Linseed Oil, Burnt Oil, Stand Oil by Fire Heat, Superheated Steam, and by a Current of Air.—VI., Behaviour of the Drying Oils and Boiled Oils towards Atmospheric Influences, Water, Acids and Alkalies.—VII., Boiled Oil Substitutes.—VIII., The Manufacture of Solid and Liquid Driers from Linseed Oil and Rosin; Linolic Acid Compounds of the Driers.—IX., The Adulteration and Examination of the Drying Oils and Boiled Oil.

**GLUE AND GLUE TESTING.** By SAMUEL RIDEAL, D.Sc. Lond., F.I.C. Fourteen Engravings. 144 pp. 1900. Price 10s. 6d.; India and Colonies, 11s.; Other Countries, 12s.; strictly net, post free.



## Contents.

Chapters I., **Constitution and Properties:** Definitions and Sources, Gelatine, Chondrin and Allied Bodies, Physical and Chemical Properties, Classification, Grades and Commercial Varieties.—II., **Raw Materials and Manufacture:** Glue Stock, Lining, Extraction, Washing and Clarifying, Filter Presses, Water Supply, Use of Alkalies, Action of Bacteria and of Antiseptics, Various Processes, Cleansing, Forming, Drying, Crushing, etc., Secondary Products.—III., **Uses of Glue:** Selection and Preparation for Use, Carpentry, Veneering, Paper-Making, Bookbinding, Printing Rollers, Hectographs, Match Manufacture, Sandpaper, etc., Substitutes for other Materials, Artificial Leather and Caoutchouc.—IV., **Gelatine:** General Characters, Liquid Gelatine, Photographic Uses, Size, Tanno-, Chrome and Formo-gelatine, Artificial Silk, Cements, Pneumatic Tyres, Culinary, Meat Extracts, Isinglass, Medicinal and other Uses, Bacteriology.—V., **Glue Testing:** Review of Processes, Chemical Examination, Adulteration, Physical Tests, Valuation of Raw Materials.—VI., **Commercial Aspects.**

### Press Opinions.

"This work is of the highest technical character, and gives not only a full and practical account of the raw materials and manufacture of glues, gelatines and similar substances, but gives many hints and information on the use of such substances in veneering, carpentry and many other purposes. Many tests are given for glue in different stages of the progress of its manufacture, and the commercial value of a commodity so much in general use is exemplified by statistics and figures. It is certainly a valuable treatise upon an article for which very little literature in any form has previously been obtainable."—*Carpenter and Builder.*

"Books on the art of glue making are more than usually scarce, and users of that article, as well as those who may be tempted to embark in the industry, should therefore welcome this book by Dr. Samuel Rideal, a Fellow of the Institute of Chemistry, and a leading authority. In this book he has collected the more important facts connected with the manufacture of glue and allied products, and stated the experience he has gained in examining various commercial samples during the past ten years. . . . Dr. Rideal's book must be regarded as a valuable contribution to other technical literature, which manufacturers, merchants and users may study with profit."—*British Trade Journal.*

"This volume is the latest addition to the excellent series of special technical works for manufacturers and professional and commercial men issued by the well-known publishers of *The Oil and Colourman's Journal*. The volume in every way fully maintains the high standard of excellence of the whole series, and deals with the subject of glue making and glue testing in a thoroughly exhaustive manner. Chapters are given on the constitution and properties, and raw material and manufacture, and of the uses of glue, and in this latter respect it will doubtless be information to many readers to learn to what extent glue enters into the manufacture of many commercial products not apparently associated with glue. Exhaustive chapters on the processes and methods of glue testing, and on its commercial aspects, complete this useful and most carefully prepared volume."—*Carriage Builders' Journal.*

**TECHNOLOGY OF PETROLEUM:** Oil Fields of the World—Their History, Geography and Geology—Annual Production and Development—Oil-well Drilling—Transport. By HENRY NEUBERGER and HENRY NOALHAT. Translated from the French by J. G. MCINTOSH. 540 pp. Illustrations, Maps and Plates. [*In the Press.*]

### Contents.

Part I., **Study of the Petroliferous Strata**—Chapters I., Petroleum—Definition.—II., The Genesis or Origin of Petroleum.—III., The Oil Fields of Galicia, their History.—IV., Physical Geography and Geology of the Galician Oil Fields.—V., Practical Notes on Galician Land Law—Economic Hints on Working, etc.—VI., Roumania—History, Geography, Geology.—VII., Petroleum in Russia—History.—VIII., Russian Petroleum (*continued*)—Geography and Geology of the Caucasian Oil Fields.—IX., Russian Petroleum (*continued*).—X., The Secondary Oil Fields of Europe, Northern Germany, Alsace, Italy, etc.—XI., Petroleum in France.—XII., Petroleum in Asia—Transcaspian and Turkestan Territory—Turkestan—Persia—British India and Burmah—British Burmah or Lower Burmah—China—Chinese Thibet—Japan, Formosa and Saghalien.—XIII., Petroleum in Oceania—Sumatra, Java, Borneo—Isle of Timor—Philippine Isles—New Zealand.—XIV., The United States of America—History.—XV., Physical Geology and Geography of the United States Oil Fields.—XVI., Canadian and other North American Oil Fields.—XVII., Economic Data of Work in North America.—XVIII., Petroleum in the West Indies and South America.—XIX., Petroleum in the French Colonies.

Part II., **Excavations.**—Chapter XX., Hand Excavation or Hand Digging of Oil Wells.  
Part III., **Methods of Boring.**—Chapters XXI., Methods of Oil-well Drilling or Boring.—XXII., Boring Oil Wells with the Rope.—XXIII., Drilling with Rigid Rods and a Free-fall—Faubin System.—XXIV., Free-fall Drilling by Steam Power.—XXV., Oil-well Drilling by the Canadian System.—XXVI., Drilling Oil Wells on the Combined System.—XXVII., Comparison between the Combined Fauck System and the Canadian.—XXVIII., The American System of Drilling with the Rope.—XXIX., Hydraulic Boring with the Drill by Hand and Steam Power.—XXX., Rotary Drilling of Oil Wells, Bits, Steel-crowned Tools, Diamond Tools—Hand Power and Steam Power—Hydraulic Sand-pumping.—XXXI., Improvements in and different Systems of Drilling Oil Wells.

Part IV., **Accidents.**—Chapters XXXII., Boring Accidents—Methods of preventing them—Methods of remedying them.—XXXIII., Explosives and the use of the "Torpedo" Levigation.—XXXIV., Storing and Transport of Petroleum.—XXXV., General Advice—Prospecting, Management and carrying on of Petroleum Boring Operations.

Part V., **General Data.**—**Customary Formulae.**—Memento. Practical Part. General Data bearing on Petroleum.—Glossary of Technical Terms used in the Petroleum Industry.—Index.

## A DICTIONARY OF CHEMICALS AND RAW PRODUCTS USED IN THE MANUFACTURE OF PAINTS, COLOURS, VARNISHES AND ALLIED PREPARATIONS. By GEORGE H. HURST, F.C.S. Demy 8vo. 380 pp. 1901. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

The names of the Chemicals and Raw Products are arranged in alphabetical order, and the description of each varies in length from half to eight pages. The following are some of the articles described and explained: Acetates—Acetic Acid—Acidimetry—Alcohol—Alum—Ammonia—Amber—Animi—Arsenic—Beeswax—Benzol—Bichromates of Potash and Soda—Bleaching Powder—Bone Black—Boric Acid—Brunswick Green—Cadmium Yellow—Carbonates—Carmines—Carnauba Wax—Caustic Potash and Soda—Chrome Colours—Clay—Coal Tar Colours—Copal—Dammar—Drying Oils—Emerald Green—Gamboge—Glue—Glycerine—Gums—Gypsum—Indian Red—Japanese Lacquer—Lac—Lakes—Lamp Black—Lead Compounds—Linseed Oil—Magnesia—Manganese Compounds—Mica—Nitric Acid—Ochres—Orange Lead—Orr's White—Paraffin—Prussian Blue—Rosin Oil—Sepia—Sienna—Smalts—Sodium Carbonate—Sublimed White Lead—Sulphuric Acid—Terra Verte—Testing Pigments—Turpentine—Ultramarine—Umbers—Vermilionettes—White Lead—Whiting—Zinc Compounds.—Appendix: Comparison of Baumé Hydrometer and Specific Gravity for Liquids Lighter than Water—Hydrometer Table for Liquids Heavier than Water—Comparison of Temperature Degrees—Tables for Converting French Metric Weights and Measures into English—Table of the Elements—etc., etc.—Copious Index.

## PURE AIR, OZONE AND WATER. A Practical Treatise of their Utilisation and Value in Oil, Grease, Soap, Paint, Glue and other Industries. By W. B. COWELL. Twelve Illustrations. 1900. Price 5s.; India and Colonies, 5s. 6d.; Other Countries, 6s.; strictly net, post free.

### Contents.

Chapters I., Atmospheric Air; Lifting of Liquids; Suction Process; Preparing Blown Oils; Preparing Siccative Drying Oils.—II., Compressed Air; Whitewash.—III., Liquid Air; Retrocession.—IV., Purification of Water; Water Hardness.—V., Fleshings and Bones.—VI., Ozonised Air in the Bleaching and Deodorising of Fats, Glues, etc.; Bleaching Textile Fibres.—Appendix: Air and Gases; Pressure of Air at Various Temperatures; Fuel; Table of Combustibles; Saving of Fuel by Heating Feed Water; Table of Solubilities of Scale Making Minerals; British Thermal Units Tables; Volume of the Flow of Steam into the Atmosphere; Temperature of Steam.—Index.

### Press Opinions.

"This is a valuable work in little space. . . . In arrangement it is a commendable work, and its value is increased by the index which brings the little volume to a close."—*Newcastle Daily Journal*.

"The book is written solely for manufacturers, who, without doubt, will find it exceedingly practical and useful. The volume contains an appendix wherein is given a great many tables, etc., which manufacturers in the trades referred to will find of inestimable value."—*Blackburn Times*.

## THE MANUFACTURE OF MINERAL AND LAKE PIGMENTS. Containing Directions for the Manufacture of all Artificial, Artists and Painters' Colours, Enamel, Soot and Metallic Pigments. A Text-book for Manufacturers, Merchants, Artists and Painters. By Dr. JOSEF BERSCH. Translated from the Second Revised Edition by ARTHUR C. WRIGHT, M.A. (Oxon.), B.Sc. (Lond.), formerly Assistant Lecturer and Demonstrator in Chemistry at the Yorkshire College, Leeds. Forty-three Illustrations. 476 pp., demy 8vo. 1901. Price 12s. 6d.; India and Colonies, 13s. 6d.; Other Countries, 15s.; strictly net, post free.



## Contents.

Chapters I., Introduction.—II., Physico-chemical Behaviour of Pigments.—III., Raw Materials Employed in the Manufacture of Pigments.—IV., Assistant Materials.—V., Metallic Compounds.—VI., The Manufacture of Mineral Pigments.—VII., The Manufacture of White Lead.—VIII., Enamel White.—IX., Washing Apparatus.—X., Zinc White.—XI., Yellow Mineral Pigments.—XII., Chrome Yellow.—XIII., Lead Oxide Pigments.—XIV., Other Yellow Pigments.—XV., Mosaic Gold.—XVI., Red Mineral Pigments.—XVII., The Manufacture of Vermilion.—XVIII., Antimony Vermilion.—XIX., Ferric Oxide Pigments.—XX., Other Red Mineral Pigments.—XXI., Purple of Cassius.—XXII., Blue Mineral Pigments.—XXIII., Ultramarine.—XXIV., Manufacture of Ultramarine.—XXV., Blue Copper Pigments.—XXVI., Blue Cobalt Pigments.—XXVII., Smalts.—XXVIII., Green Mineral Pigments.—XXIX., Emerald Green.—XXX., Verdigris.—XXXI., Chromium Oxide.—XXXII., Other Green Chromium Pigments.—XXXIII., Green Cobalt Pigments.—XXXIV., Green Manganese Pigments.—XXXV., Compounded Green Pigments.—XXXVI., Violet Mineral Pigments.—XXXVII., Brown Mineral Pigments.—XXXVIII., Brown Decomposition Products.—XXXIX., Black Pigments.—XL., Manufacture of Soot Pigments.—XLI., Manufacture of Lamp Black.—XLII., The Manufacture of Soot Black without Chambers.—XLIII., Indian Ink.—XLIV., Enamel Colours.—XLV., Metallic Pigments.—XLVI., Bronze Pigments.—XLVII., Vegetable Bronze Pigments.

PIGMENTS OF ORGANIC ORIGIN.—Chapters XLVIII., Lakes.—XLIX., Yellow Lakes.—L., Red Lakes.—LI., Manufacture of Carmine.—LII., The Colouring Matter of Lac.—LIII., Safflower or Carthamine Red.—LIV., Madder and its Colouring Matters.—LV., Madder Lakes.—LVI., Manjit (Indian Madder)—LVII., Lichen Colouring Matters.—LVIII., Red Wood Lakes.—LIX., The Colouring Matters of Sandal Wood and Other Dye Woods.—LX., Blue Lakes.—LXI., Indigo Carmine.—LXII., The Colouring Matter of Log Wood.—LXIII., Green Lakes.—LXIV., Brown Organic Pigments.—LXV., Sap Colours.—LXVI., Water Colours.—LXVII., Crayons.—LXVIII., Confectionery Colours.—LXIX., The Preparation of Pigments for Painting.—LXX., The Examination of Pigments.—LXXI., Examination of Lakes.—LXXII., The Testing of Dye-Woods.—LXXIII., The Design of a Colour Works.—LXXIV.—Commercial Names of Pigments.—Appendix: Conversion of Metric to English Weights and Measures.—Centigrade and Fahrenheit Thermometer Scales.—Index.

**BONE PRODUCTS AND MANURES: An Account of the most recent Improvements in the Manufacture of Fat, Glue, Animal Charcoal, Size, Gelatine and Manures.** By THOMAS LAMBERT, Technical and Consulting Chemist. Illustrated by Twenty Plans and Diagrams. Demy 8vo. 1901. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.

## Contents.

Chapters I., Chemical Composition of Bones—Arrangement of Factory—Crushing of Bones—Treatment with Benzene—Benzene in Crude Fat—Analyses of Clarified Fats—Mechanical Cleansing of Bones—Animal Charcoal—Tar and Ammoniacal Liquor, Char and Gases, from good quality Bones—Method of Retorting the Bones—Analyses of Chars—"Spent" Chars—Cooling of Tar and Ammoniacal Vapours—Value of Nitrogen for Cyanide of Potash—Bone Oil—Marrow Bones—Composition of Marrow Fat—Premier Juice—Buttons.—II., Properties of Glue—Glutin and Chondrin—Skin Glue—Liming of Skins—Washing—Boiling of Skins—Clarification of Glue Liquors—Acid Steeping of Bones—Water System of Boiling Bones—Steam Method of Treating Bones—Nitrogen in the Treated Bones—Glue-Boiling and Clarifying-House—Plan showing Arrangement of Clarifying Vats—Plan showing Position of Evaporators—Description of Evaporators—Sulphurous Acid Generator—Clarification of Liquors—Section of Drying-House—Specification of a Glue—Size—Uses and Preparation and Composition of Size—Concentrated Size.—III., Properties of Gelatine—Preparation of Skin Gelatine—Washing—Bleaching—Boiling—Clarification—Evaporation—Drying—Bone Gelatine—Selecting Bones—Crushing—Dissolving—Bleaching—Boiling—Properties of Glutin and Chondrin—Testing of Glues and Gelatines.—IV., The Uses of Glue, Gelatine and Size in Various Trades—Soluble and Liquid Glues—Steam and Waterproof Glues.—V., Manures—Importation of Food Stuffs—Soils—Germination—Plant Life.—VI., Natural Manures—Water and Nitrogen in Farmyard Manure—Full Analysis of Farmyard Manure—Action on Crops—Water-Closet System—Sewage Manure—Green Manures.—VII., Artificial Manures—Bones—Boiled and Steamed Bones—Mineral Phosphates—English Coprolites—French and Spanish Phosphorites—German and Belgian Phosphates—Basic Slag—Guanos Proper—Guano Phosphates.—VIII., Mineral Manures—Common Salt—Potash Salts—Calcareous Manures—Prepared Nitrogenous Manures—Ammoniacal Compounds—Sodium Nitrate—Potassium Nitrate—Organic Nitrogenous Matters—Shoddy—Hoofs and Horns—Leather Waste—Dried Meat—Dried Blood—Superphosphates—Composition—Manufacture—Section of Manure-Shed—First and Ground Floor Plans of Manure-Shed—Quality of Acid Used—Mixings—Special Manures—Potato Manure—Dissolved Bones—Dissolved Bone Compound—Enriched Peruvian Guano—Special Manure for Garden Stuffs, etc.—Special Manure for Grass Lands—Special Tobacco Manures—Sugar-Cane Manure—Compounding of Manures—Valuation of Manures.—IX., Analyses of Raw and Finished Products—Common Raw Bones—Degreased Bones—Crude Fat—Refined Fat—Degelatinised Bones—Animal Charcoal—Bone Superphosphates—Guanos—Dried Animal Products—Potash Compounds—Sulphate of Ammonia.—Index.

## MANUFACTURE OF PAINT. By J. CRUICKSHANK SMITH, B.Sc. With numerous Illustrations. [In the Press.]

### Contents.

Part I.—Chapters I., Preparation of Raw Material.—II., Storing of Raw Material.—III., Testing and Valuation of Raw Material—Paint Plant and Machinery.

Part II.—Chapters V., The Grinding of White Lead.—VI., Grinding of White Zinc.—VII., Grinding of other White Pigments.—VIII., Grinding of Oxide Paints.—IX., Grinding of Staining Colours.—X., Grinding of Black Paints.—XI., Grinding of Chemical Colours—Yellows.—XII., Grinding of Chemical Colours—Blues.—XIII., Grinding Greens.—XIV., Grinding Reds.—XV., Grinding Lakes.—XVI., Grinding Colours in Water.—XVII., Grinding Colours in Turpentine.

Part III.—Chapters XVIII., The Uses of Paint.—XIX., Testing and Matching Paints.—XX., Economic Considerations.—Index.

## THE RISKS AND DANGERS OF VARIOUS OCCUPATIONS AND THEIR PREVENTION. By LEONARD A. PARRY, M.D., B.S. (Lond.). 196 pp., demy 8vo. 1900. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

Chapters I., Occupations which are Accompanied by the Generation and Scattering of Abnormal Quantities of Dust.—II., Trades in which there is Danger of Metallic Poisoning.—III., Certain Chemical Trades.—IV., Some Miscellaneous Occupations.—V., Trades in which Various Poisonous Vapours are Inhaled.—VI., General Hygienic Considerations.—Index.

This book contains valuable information for the following trades—Aerated Water Manufacture, Alkali Manufacture, Aniline Manufacture, Barometer Making, Brass Founders, Bromine Manufacture, Bronze Moulders, Brush Making, Builders, Cabinet Makers, Calico Printing, Chloride of Lime Manufacture, Coal Miners, Cocoa-nut Fibre Making, Colour Grinders, Copper Miners, Cotton Goods Manufacture, Cotton Yarn Dyeing, Cutlery Trades, Dry Cleaning, Electricity Generating, Electroplaters, Explosives Manufacture, File Making, Flint Milling, Floor Cloth Makers, Furriers, Fustian Clothing Making, Galvanised Iron Manufacture, Gassing Process, Gilders, Glass Making, Glass Paper Making, Glass Polishing and Cutting, Grinding Processes, Gunpowder Manufacturing, Gutta-percha Manufacture, Hat Makers, Hemp Manufacture, Horn Goods Making, Horse-hair Making, Hydrochloric Acid Manufacture, India-rubber Manufacture, Iodine Manufacture, Ivory Goods Making, Jewellers, Jute Manufacture, Knife Grinders, Knife Handle Makers, Lace Makers, Lacquering, Lead Melters, Lead Miners, Leather Making, Linen Manufacture, Linoleum Making, Lithographic Printing and Bronzing, Lithographing, Masons, Match Manufacture, Melanite Making, Mirror Making, Needle Grinders, Needle Making, Nitro-benzole Making, Nitro-glycerine Making, Paint Makers, Paper Making, Philosophical Instrument Makers, Photographers, Picric Acid Making, Portland Cement Making, Pottery Manufacture, Printers, Quicksilver Mining, Rag Pickers, Razor Grinders, Red Lead Making, Rope Making, Sand Paper Making, Saw Grinders, Scissors Grinders, Shoddy Manufacture, Shot Making, Silk Making, Silver Mining, Skinners, Slag, Wood Manufacture, Steel Makers, Steel Pen Making, Stereotypers, Stone Masons, Straw Hat Makers, Sulphuric Acid Manufacture, Sweeps, Table-knife Grinders, Tanners, Telegraphists, Textile Industries, Tin Miners, Turners, Type Founders, Umbrella Makers, Wall Paper Making, White Lead Making, Wood Working, Woollen Manufacture, Wool Sorters, Zinc Oxide Manufacture, Zinc Working, etc., etc.

### Press Opinions.

"The language used is quite simple, and can be understood by any intelligent person engaged in the trades dealt with."—*The Clarion*.

"This is an appalling book. It shows that there is scarcely a trade or occupation that has not a risk or a danger attached to it."—*Local Government Journal*.

"Dr. Parry has not only pointed out the 'risks and dangers of various occupations'; he has suggested means for their prevention. The work is primarily a practical one."—*Colliery Manager*.

"This is a most useful book which should be in the hands of all employers of labour, foremen, and intelligent workmen, and is one of great utility to sanitary inspectors, and even on occasion to medical men."—*Health*.

"The writer has succeeded in collecting a large amount of information, and though one could wish he had presented it in a rather more attractive style, he has certainly condensed it into a very small space."—*Physician and Surgeon*.

"The little book before us is one which will be found exceedingly useful to manufacturers and even factory inspectors. . . . No attempt is made to show how diseases when originated are to be cured, but, acting on the sound principle that prevention is better than cure, means are stated how to avoid the harm."—*Bristol Mercury*.

"The author has endeavoured to treat the question in simple rather than in technical language, and he has lucidly catalogued the most dangerous trades and their symptoms, and in each case specified the best methods of dealing with them. . . . To those for whom the volume is especially designed, Dr. Parry's treatise should be a useful handbook."—*Sheffield Independent*.



"A very useful manual for employers of labour, foremen, intelligent workmen, and, in spite of the author's modesty, for medical men. We have the peculiar risks and dangers of all the dangerous trades carefully described; the mode of action of various chemicals, etc., used in different industries given, with full directions how to minimise unavoidable risks."—*Leeds Mercury*.

"Most of the trades in the country are alluded to, and upon those that are dangerous the necessary attention is bestowed, and means are recommended whereby danger may be prevented or lessened. The author has evidently studied his subject with care, and has made full use of the experience of others who have had a larger insight into the industries of the country."—*British Medical Journal*.

"The work is well written and printed, and its verbiage such as to be comprehensible to the workman no less than to the master. The careful and general perusal of a work of this nature cannot but be attended by beneficial results of a far-reaching nature, and we therefore heartily recommend the book to our readers. Medical Officers of Health and Sanitary Inspectors especially should find the work of great interest."—*Sanitary Record*.

"It is written in simple language, and its instructions can be easily followed. . . . There are some employers, at any rate, who are more ignorant of, than indifferent to, the slow murder of their workpeople, and if the facts so succinctly set forth in this book were brought to their notice, and if the Trade Unions made it their business to insist on the observance of the better conditions Dr. Parry described, much might be done to lessen the workman's peril."—*Weekly Times and Echo*.

**PRACTICAL X RAY WORK.** By FRANK T. ADDYMAN, B.Sc. (Lond.), F.I.C., Member of the Roentgen Society of London; Radiographer to St. George's Hospital; Demonstrator of Physics and Chemistry, and Teacher of Radiography in St. George's Hospital Medical School. Demy 8vo. Illustrated. [In the Press.]

#### Contents.

Part I., **Historical**—Chapters I., Introduction.—II., Work leading up to the Discovery of the X Rays.—III., The Discovery.

Part II., **Apparatus and its Management**—Chapters I., Electrical Terms.—II., Sources of Electricity.—III., Induction Coils.—IV., Electrostatic Machines.—V., Tubes.—VI., Air Pumps.—VII., Tube Holders and Stereoscopic Apparatus.—VIII., Fluorescent Screens.

Part III., **Practical X Ray Work**—Chapters I., Installations.—II., Radioscopy.—III., Radiography.—IV., X Rays in Dentistry.—V., X Rays in Chemistry.—VI., X Rays in War.—Index.

**DRYING BY MEANS OF AIR AND STEAM.** Explanations, Formulæ, and Tables for Use in Practice. Translated from the German of E. HAUSBRAND. Two Diagrams and Thirteen Tables. [In the Press.]

#### Contents.

Preface.—Chapters I., Introduction.—II., Estimation of the Maximum Weight of Saturated Aqueous Vapour which can be contained in 1 kilo. of Air at Different Pressure and Temperatures.—III., Calculation of the Necessary Weight and Volume of Air, and of the Least Expenditure of Heat, per Drying Apparatus with Heated Air, at the Atmospheric Pressure: *A*, With the Assumption that the Air is *Completely Saturated* with Vapour both before Entry and after Exit from the Apparatus.—*B*, When the Atmospheric Air is Completely Saturated before entry, but at its exit is only  $\frac{3}{4}$ ,  $\frac{1}{2}$  or  $\frac{1}{4}$  Saturated.—*C*, When the Atmospheric Air is not Saturated with Moisture before Entering the Drying Apparatus.—IV., Drying Apparatus, in which, in the Drying Chamber, a Pressure is Artificially Created, Higher or Lower than that of the Atmosphere.—V., Drying by Means of Superheated Steam, without Air.—VI., Heating Surface, Velocity of the Air Current, Dimensions of the Drying Room, Surface of the Drying Material. Losses of Heat.

## Leather Trades.

**THE LEATHER WORKER'S MANUAL.** Being a Compendium of Practical Recipes and Working Formulæ for Curriers, Bootmakers, Leather Dressers, Blacking Manufacturers, Saddlers, Fancy Leather Workers, and all Persons engaged in the Manipulation of Leather. By H. C. STANDAGE. 165 pp. 1900. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

#### Contents.

Chapters I., Blackings, Polishes, Glosses, Dressings, Renovators, etc., for Boot and Shoe Leather.—II., Harness Blackings, Dressings, Greases, Compositions, Soaps, and Boot-top Powders and Liquids, etc.—III., Leather Grinders' Sundries.—IV., Currier's Seasonings, Blacking Compounds, Dressings, Finishes, Glosses, etc.—V., Dyes and Stains for Leather.—VI., Miscellaneous Information.—VII., Chrome Tannage.—Index.

### Press Opinions.

"The book being absolutely unique, is likely to be of exceptional value to all whom it concerns, as it meets a long-felt want."—*Birmingham Gazette*.

"This is a valuable collection of practical receipts and working formulæ for the use of those engaged in the manipulation of leather. We have no hesitation in recommending it as one of the best books of its kind, an opinion which will be endorsed by those to whom it appeals."—*Liverpool Mercury*.

"We think we may venture to state, so far as the opinion of the leather trade under the Southern Cross is concerned, that it will be one of approval. As practical men, having a long and wide experience of the leather trade in Australia, we are certain that there are many tanners and carriers carrying on business in remote townships of the colonies to whom such a manual of practical recipes will be invaluable. . . . This manual is not a mere collection of recipes for the various purposes to which they may be applied, but it is also replete with instructions concerning the nature of the materials recommended to be used in making up the recipes. . . . We think every intelligent leather man should avail himself of the manual. It is undoubtedly a valuable contribution to the technology of the leather trade."—*Australian Leather Journal and Boot and Shoe Recorder*.

## PRACTICAL TREATISE ON THE LEATHER INDUSTRY.

By A. M. VILLON. A Translation of Villon's "Traité Pratique de la Fabrication des cuirs et du Travail des Peaux".

By FRANK T. ADDYMAN, B.Sc. (Lond.), F.I.C., F.C.S.; and Corrected by an Eminent Member of the Trade. 500 pp., royal 8vo. 1901. 123 Illustrations. Price 21s.; India and Colonies, 22s.; Other Countries, 23s. 6d.; strictly net, post free.

### Contents.

Preface—Translator's Preface—List of Illustrations.

Part I., **Materials used in Tanning**—Chapter I., Skins; I., Skin and its Structure; II., Skins used in Tanning; III., Various Skins and their Uses—Chapter II., Tannin and Tanning Substances: I., Tannin; II., Barks (Oak); III., Barks other than Oak; IV., Tanning Woods; V., Tannin-bearing Leaves; VI., Excrescences; VII., Tan-bearing Fruits; VIII., Tan-bearing Roots and Bulbs; IX., Tanning Juices; X., Tanning Substances used in Various Countries; XI., Tannin Extracts; XII., Estimation of Tannin and Tannin Principles.

Part II., **Tanning**—Chapter I., The Installation of a Tannery: I., Tan Furnaces; II., Chimneys, Boilers, etc.; III., Steam Engines—Chapter II., Grinding and Trituration of Tanning Substances: I., Cutting up Bark; II., Grinding Bark; III., The Grinding of Tan Woods; IV., Powdering Fruit, Galls and Grains; V., Notes on the Grinding of Bark—Chapter III., Manufacture of Sole Leather: I., Soaking; II., Sweating and Unhairing; III., Plumping and Colouring; IV., Handling; V., Tanning; VI., Tanning Elephants' Hides; VII., Drying; VIII., Striking or Pinning—Chapter IV., Manufacture of Dressing Leather: I., Soaking; II., Depilation; III., New Processes for the Depilation of Skins; IV., Tanning; V., Cow Hides; VI., Horse Hides; VII., Goat Skins; Manufacture of Split Hides—Chapter V., On Various Methods of Tanning: I., Mechanical Methods; II., Physical Methods; III., Chemical Methods; IV., Tanning with Extracts—Chapter VI., Quantity and Quality: I., Quantity; II., Net Cost; III., Quality of Leather—Chapter VII., Various Manipulations of Tanned Leather: I., Second Tanning; II., Grease Stains; III., Bleaching Leather; IV., Waterproofing Leather; V., Weighting Tanned Leather; VI., Preservation of Leather—Chapter VIII., Tanning Various Skins.

Part III., **Currying**—Chapter I., Waxed Calf: I., Preparation; II., Shaving; III., Stretching or Slicking; IV., Oiling the Grain; V., Oiling the Flesh Side; VI., Whitening and Graining; VII., Waxing; VIII., Finishing; IX., Dry Finishing; X., Finishing in Colour; XI., Cost—Chapter II., White Calf: I., Finishing in White—Chapter III., Cow Hide for Upper Leathers: I., Black Cow Hide; II., White Cow Hide; III., Coloured Cow Hide.—Chapter IV., Smooth Cow Hide—Chapter V., Black Leather—Chapter VI., Miscellaneous Hides: I., Horse; II., Goat; III., Waxed Goat Skin; IV., Matt Goat Skin—Chapter VII., Russia Leather: I., Russia Leather; II., Artificial Russia Leather.

Part IV., **Enamelled, Hungary and Chamoy Leather, Morocco, Parchment, Furs and Artificial Leather**—Chapter I., Enamelled Leather: I., Varnish Manufacture; II., Application of the Enamel; III., Enamelling in Colour—Chapter II., Hungary Leather: I., Preliminary; II., Wet Work or Preparation; III., Aluming; IV., Dressing or Loft Work; V., Tallowing; VI., Hungary Leather from Various Hides—Chapter III., Tawing: I., Preparatory Operations; II., Dressing; III., Dyeing Tawed Skins; IV., Rugs—Chapter IV., Chamoy Leather—Chapter V., Morocco: I., Preliminary Operations; II., Morocco Tanning; III., Mordants used in Morocco Manufacture; IV., Natural Colours used in Morocco Dyeing; V., Artificial Colours; VI., Different Methods of Dyeing; VII., Dyeing with Natural Colours; VIII., Dyeing with Aniline Colours; IX., Dyeing with Metallic Salts; X., Leather Printing; XI., Finishing Morocco; XII., Shagreen; XIII., Bronzed Leather—Chapter VI., Gilding and Silvering: I., Gilding; II., Silvering; III., Nickel and Cobalt—Chapter VII., Parchment—Chapter VIII., Furs and Furriery: I., Preliminary Remarks; II., Indigenous Furs; III., Foreign Furs from Hot Countries; IV., Foreign Furs from Cold Countries; V., Furs from Birds' Skins; VI., Preparation of Furs; VII., Dressing; VIII., Colouring; IX., Preparation of Birds' Skins; X., Preservation of Furs—Chapter IX., Artificial Leather: I.,



Leather made from Scraps; II., Compressed Leather; III., American Cloth; IV., Papier Mâché; V., Linoleum; VI., Artificial Leather.

**Part V., Leather Testing and the Theory of Tanning**—Chapter I., Testing and Analysis of Leather: I., Physical Testing of Tanned Leather; II., Chemical Analysis—Chapter II., The Theory of Tanning and the other Operations of the Leather and Skin Industry: I., Theory of Soaking; II., Theory of Unhairing; III., Theory of Swelling; IV., Theory of Handling; V. Theory of Tanning; VI., Theory of the Action of Tannin on the Skin; VII., Theory of Hungary Leather Making; VIII., Theory of Tawing; IX., Theory of Chamoy Leather Making; X., Theory of Mineral Tanning.

**Part VI., Uses of Leather**—Chapter I., Machine Belts: I., Manufacture of Belting; II., Leather Chain Belts; III., Various Belts, IV., Use of Belts—Chapter II., Boot and Shoemaking: I., Boots and Shoes; II., Laces—Chapter III., Saddlery: I., Composition of a Saddle; II., Construction of a Saddle—Chapter IV., Harness: I., The Pack Saddle; II., Harness—Chapter V., Military Equipment—Chapter VI., Glove Making—Chapter VII., Carriage Building—Chapter VIII., Mechanical Uses.

**Appendix, The World's Commerce in Leather**—I., Europe; II., America; III., Asia; IV., Africa; Australasia—Index.

### Press Opinions.

"The book is well and lucidly written. The writer is evidently a practical man, who also has taken the trouble to make himself acquainted with the scientific and technical side of his trade. . . . French methods differ largely from our own; sometimes we think our ways the best, but not always. The practical man may pick up many useful hints which may help him to improve his methods."—*Shoe Manufacturers' Monthly Journal*.

"This book cannot fail to be of great value to all engaged in the leather trades. . . . The British may believe that the French can teach them nothing in the work of leather tanning generally, but a comparison of the methods of the two countries will certainly yield a few wrinkles which may lead to advantageous results. Only a man understanding the science and technique of the trade could have written the book, and it is well done."—*Midland Free Press*.

"Gives much useful and interesting information concerning the various processes by which the skins of animals are converted into leather. Written by a French Chemist after five years of constant study and application; it shows all that detail of analysis which we are accustomed to find in scientists, and which the practical tanner is too much in the habit of ignoring, sometimes to his own loss."—*Leeds Mercury*.

"Nor can there be much doubt that this expectation will be fully justified by the result. Thanks to the conspicuous painstaking with which Mr. Addyman has discharged his duty, and the 123 illustrations by which the text is elucidated, the volume can hardly fail to prove a very valuable standard work of its class. It can thus be confidently recommended to all who are more or less practically interested in the technology of a very important subject."—*Leicester Post*.

"M. Villon writes as one having a very full knowledge of all branches of the subject, and in days when foreign competition has enforced on English manufacturers the importance of no longer being content with rule-of-thumb methods which have come down to them from their forefathers it certainly should be worth the while of English tanners to see what lessons they can learn from French practice, and French practice, we should imagine, could hardly have a better exponent than the author of this large volume."—*Western Daily Press and Bristol Times*.

"At a time when all or nearly all our British industries are to a greater or less extent hampered by the pressure of continental and American competition, any hints that can be obtained as to the methods pursued by competitors must necessarily be of value. . . . That it will be of interest and value, not merely to English tanners, but to those associated with many kindred industrial branches, goes without saying. . . . As a work of reference the volume will be extremely useful in the trade, and where leisure affords sufficient opportunity a careful perusal and study of it would afford ample reward."—*Kettering Guardian*.

"This is a very handsomely got up and elaborate work just issued by this well-known technical book-publishing firm. . . . When we say that the work consists of over 500 large pages with about 120 illustrations, and almost innumerable tables, it will be seen at once that we cannot attempt anything like an exhaustive *résumé* of its contents, and even if we did the details would be of little interest to our general readers, while those who are engaged in the leather industry will probably obtain the book for themselves—at least they would do well to do so. . . . Altogether the 'Treatise' has evidently been very carefully prepared, and by a man who thoroughly knows the subject, and hence it will be a very valuable technical book for English firms and workers."—*Walsall Observer*.

## Books on Pottery, Glass, etc.

**THE MANUAL OF PRACTICAL POTTING.** Second Edition, Revised and Enlarged. 200 pp. 1897. Price 17s. 6d.; India and Colonies, 18s. 6d.; Other Countries, 20s.; strictly net, post free.

### Contents.

**Introduction.** The Rise and Progress of the Potter's Art.—Chapters I., **Bodies.** China and Porcelain Bodies, Parian Bodies, Semi-porcelain and Vitreous Bodies, Mortar Bodies, Earthenwares Granite and C.C. Bodies, Miscellaneous Bodies, Sagger and Crucible Clays,

Coloured Bodies, Jasper Bodies, Coloured Bodies for Mosaic Painting, Encaustic Tile Bodies, Body Stains, Coloured Dips.—II., **Glazes.** China Glazes, Ironstone Glazes, Earthenware Glazes, Glazes without Lead, Miscellaneous Glazes, Coloured Glazes, Majolica Colours.—III., **Gold and Cold Colours.** Gold, Purple of Cassius, Marone and Ruby, Enamel Coloured Bases, Enamel Colour Fluxes, Enamel Colours, Mixed Enamel Colours, Antique and Vellum Enamel Colours, Underglaze Colours, Underglaze Colour Fluxes, Mixed Underglaze Colours, Flow Powders, Oils and Varnishes.—IV., **Means and Methods.** Reclamation of Waste Gold, The Use of Cobalt, Notes on Enamel Colours, Liquid or Bright Gold.—V., **Classification and Analysis.** Classification of Clay Ware, Lord Playfair's Analysis of Clays, The Markets of the World, Time and Scale of Firing, Weights of Potter's Material, Decorated Goods Count.—VI., Comparative Loss of Weight of Clays.—VII., Ground Felspar Calculations.—VIII., The Conversion of Slop Body Recipes into Dry Weight.—IX., The Cost of Prepared Earthenware Clay.—X., **Forms and Tables.** Articles of Apprenticeship, Manufacturer's Guide to Stocktaking, Table of Relative Values of Potter's Materials, Hourly Wages Table, Workman's Settling Table, Comparative Guide for Earthenware and China Manufacturers in the use of Slop Flint and Slop Stone, Foreign Terms applied to Earthenware and China Goods, Table for the Conversion of Metrical Weights and Measures on the Continent of South America. **Index.**

**CERAMIC TECHNOLOGY:** Being some Aspects of Technical Science as Applied to Pottery Manufacture. Edited by CHARLES F. BINNS. 100 pp. 1897. Price 12s. 6d.; India and Colonies, 13s. 6d.; Other Countries, 15s.; strictly net, post free.

#### Contents.

Preface.—Introduction.—Chapters I., The Chemistry of Pottery.—II., Analysis and Synthesis.—III., Clays and their Components.—IV., The Biscuit Oven.—V., Pyrometry.—VI., Glazes and their Composition.—VII., Colours and Colour-making.—Index.

**RECIPES FOR FLINT GLASS MAKING.** By a British Glass Master and Mixer. Sixty Recipes. Being Leaves from the Mixing Book of several experts in the Flint Glass Trade, containing up-to-date recipes and valuable information as to Crystal, Demi-crystal and Coloured Glass in its many varieties. It contains the recipes for cheap metal suited to pressing, blowing, etc., as well as the most costly crystal and ruby. British manufacturers have kept up the quality of this glass from the arrivals of the Venetians to Hungry Hill, Stourbridge, up to the present time. The book also contains remarks as to the result of the metal as it left the pots by the respective metal mixers, taken from their own memoranda upon the originals. 1900. Price for United Kingdom, 10s. 6d.; Abroad, 15s.; United States, \$4; strictly net, post free.

#### Contents.

Ruby—Ruby from Copper—Flint for using with the Ruby for Coating—A German Metal—Cornelian, or Alabaster—Sapphire Blue—Crysophis—Opal—Turquoise Blue—Gold Colour—Dark Green—Green (common)—Green for Malachite—Blue for Malachite—Black for Malachite—Black—Common Canary Batch—Canary—White Opaque Glass—Sealing-wax Red—Flint—Flint Glass (Crystal and Demi)—Achromatic Glass—Paste Glass—White Enamel—Firestone—Dead White (for moons)—White Agate—Canary—Canary Enamel—Index.

**COLOURING AND DECORATION OF CERAMIC WARE.** By ALEX. BRONGNIART. With Notes and Additions by ALPHONSE SALVETAT. Translated from the French. 200 pp. 1898. Price 7s. 6d.; Abroad, 8s.; strictly net, post free.

#### Contents.

The Pastes, Bodies or Ceramic Articles Capable of being Decorated by Vitrifiable Colours—The Chemical Preparation of Vitrifiable Colours—Composition and Preparation of Vitrifiable Colours—The Oxides—Preparation of Oxides—Preparation of Chromates—Preparation of other Colours—Composition and Preparation of Fluxes—Muffle Colours—Recipes for Colours—Use of Metals—Lustres—Preparation and Application of Colours—Composition of Coloured Pastes—Underglaze Colours—Colours in the Glaze—Overglaze Colours—Painting in Vitrifiable Colours—Gilding—Burnishing—Printing—Enlarging and Reducing Gelatine Prints—Muffle Kilns for Vitrifiable Colours—Influence of the Material on the Colour—Changes Resulting from the Actions of the Fire—Alterations Resulting from the Colours—Alterations in Firing.



**HOW TO ANALYSE CLAY.** Practical Methods for Practical Men. By HOLDEN M. ASHBY, Professor of Organic Chemistry, Harvey Medical College, U.S.A. Twenty Illustrations. 1898. Price 2s. 6d.; strictly net, post free, home or abroad.

### Contents.

List of Apparatus—List of Atomic Weights—Use of Balance, and Burette, Sand Bath, and Water Bath—Dessicator—Drying Oven—Filtering—Fusion—Determination of Water, Organic Matter, Iron, Calcium, Alkalies, Limestone, Silica, Alumina Magnesium, etc.—Mechanical Analysis—Rational Analysis—Standard Solutions—Volumetric Analysis—Standards for Clay Analysis—Sampling.

## Architectural Pottery.

**ARCHITECTURAL POTTERY.** Bricks, Tiles, Pipes, Enamelled Terra-cottas, Ordinary and Incrusted Quarries, Stoneware Mosaics, Faïences and Architectural Stoneware. By LEON LÉFÈVRE. With Five Plates. 950 Illustrations in the Text, and numerous Estimates. 500 pp., royal 8vo. 1900. Translated from the French by K. H. BIRD, M.A., and W. MOORE BINNS. Price 15s.; India and Colonies, 16s.; Other Countries, 17s. 6d.; strictly net, post free.

### Contents.

Part I. **Plain Undecorated Pottery.**—Chapter I., Clays: § 1, Classification, General Geological Remarks.—Classification, Origin, Locality: § 2, General Properties and Composition: Physical Properties, Contraction, Analysis, Influence of Various Substances on the Properties of Clays: § 3, Working of Clay-Pits—1. Open Pits: Extraction, Transport, Cost—II. Underground Pits—Mining Laws. Chapter II., Preparation of the Clay: Weathering, Mixing, Cleaning, Crushing and Pulverising—Crushing Cylinders and Mills, Pounding Machines—Damping: Damping Machines—Soaking, Shortening, Pugging: Horse and Steam Pug-Mills, Rolling Cylinders—Particulars of the Above Machines. Chapter III., Bricks: § 1, Manufacture—(1) Hand and Machine Moulding.—I. Machines Working by Compression: on Soft Clay, on Semi-Firm Clay, on Firm Clay, on Dry Clay.—II. Expression Machines: with Cylindrical Propellers, with Screw Propellers—Dies—Cutting-tables—Particulars of the Above Machines—General Remarks on the Choice of Machines—Types of Installations—Estimates—Plenishing, Hand and Steam Presses, Particulars—(2) Drying, by Exposure to Air, Without Shelter, and Under Sheds—Drying-rooms in Tiers, Closed Drying-rooms, in Tunnels, in Galleries—Detailed Estimates of the Various Drying-rooms, Comparison of Prices—Transport from the Machines to the Drying-rooms, Barrows, Trucks, Plain or with Shelves, Lifts—(3) Firing—1. In Clamps—II. In Intermittent Kilns. *A*, Open: *a*, using Wood; *b* Coal; *b'*, in Clamps; *b''*, Flame—*B*, Closed: *c*, Direct Flame; *c'*, Rectangular; *c''*, Round; *d*, Reverberatory—III. Continuous Kilns: *C*, with Solid Fuel: Round Kiln, Rectangular Kiln, Chimneys (Plans and Estimates)—*D*, With Gas Fuel, Fillard Kiln (Plans and Estimates), Schneider Kiln (Plans and Estimates), Water-gas Kiln—Heat Production of the Kilns: § 2, Dimensions, Shapes, Colours, Decoration, and Quality of Bricks—Hollow Bricks, Dimensions and Prices of Bricks, Various Shapes, Qualities—Various Hollow Bricks, Dimensions, Resistance, Qualities; § 3, Applications—History—Asia, Africa, America, Europe: Greek, Roman, Byzantine, Turkish, Romanesque, Gothic, Renaissance, Architecture—Architecture of the Nineteenth Century: in Germany, England, Belgium, Spain, Holland, France, America—Use of Bricks—Walls, Arches, Pavements, Flues, Cornices—Facing with Coloured Bricks—Balustrades. Chapter IV., Tiles: § 1, History: § 2, Manufacture—(1) Moulding, by Hand, by Machinery: Preparation of the Clay, Soft Paste, Firm Paste, Hard Paste—Preparation of the Slabs, Transformation into Flat Tiles, into Jointed Tiles—Screw, Cam and Revolver Presses—Particulars of Tile-presses—(2) Drying—Planchettes, Shelves, Drying-barrows and Trucks—(3) Firing—Divided Kilns—Installation of Mechanical Tileworks—Estimates: § 3, Shapes, Dimensions and Uses of the Principal Types of Tile—Ancient Tiles: Flat, Round, Roman, Flemish—Modern Tiles—With Vertical Interrupted Join: Gilardoni's, Martin's; Hooked, Boulet's Villa; with Vertical Continuous Join: Muller's, Alsace, Pantile—Foreign Tiles—Special Tiles—Ridge Tiles, Coping Tiles, Border Tiles, Frontons, Gutters, Antefixes, Membrons, Angular—Roofing Accessories: Chimney-pots, Mitrons, Lanterns, Chimneys—Qualities of Tiles—Black Tiles—Stoneware Tiles—Particulars of Tiles. Chapter V., Pipes: I. Conduit Pipes—Manufacture—Moulding: Horizontal Machines, Vertical Machines, Worked by Hand and Steam—Particulars of these Machines—Drying—Firing—II. Chimney Flues—Ventiducts and "Boisseaux," "Waggons"—Particulars of these Products. Chapter VI., Quarries: 1, Plain Quarries of Ordinary Clay; 2, of Cleaned Clay—Machines, Cutting, Mixing, Polishing—Drying and Firing—Applications—Particulars of Quarries. Chapter VII., Terra-cotta: History—Manufacture—Application: Balustrades, Columns, Pilasters, Capitals, Friezes, Frontons, Medallions, Panels, Rose-windows, Ceilings—Appendix: Official Methods of Testing Terra-cottas.

Part II. **Made-up or Decorated Pottery.**—Chapter I., General Remarks on the Decoration of Pottery: Dips—Glazes: Composition, Colouring, Preparation, Harmony with

Pastes—Special Processes of Decoration—Enamels, Opaque, Transparent, Colours, Under-glaze, Over-glaze—Other Processes: Crackling, Mottled, Flashing, Metallic Iridescence, Lustres. Chapter II., Glazed and Enamelled Bricks—History: Glazing—Enamelling—Applications: Ordinary Enamelled Bricks, Glazed Stoneware, Enamelled Stoneware—Enamelled Tiles. Chapter III., Decorated Quarries: I. Paving Quarries—1, Decorated with Dips—2, Stoneware: *A*, Fired to Stoneware; *a*, of Slag Base—Applications: *b*, of Melting Clay—Applications—*B*, Plain or Incrusted Stoneware; *a*, of Special Clay (Stoke-on-Trent)—Manufacture—Application—*b*, of Felspar Base—Colouring, Manufacture, Moulding, Drying, Firing—Applications.—II. Facing Quarries—1, in Faïence—*A*, of Limestone Paste—*B*, of Silicious Paste—*C*, of Felspar Paste—Manufacture, Firing—2, of Glazed Stoneware—3, of Porcelain—Applications of Facing Quarries.—III. Stove Quarries—Preparation of the Pastes, Moulding, Firing, Enamelling, Decoration—Applications—Faïences for Fireplaces. Chapter IV., Architectural Decorated Pottery: § 1, Faïences; § 2, Stoneware; § 3, Porcelain. Chapter V., Sanitary Pottery: Stoneware Pipes: Manufacture, Firing—Applications—Sinks—Applications—Urinals, Seats and Pans—Applications—Drinking-fountains, Washstands. Index.

### Press Opinions.

"The work is profusely illustrated, and contains a large amount of useful information, and should be of great value to manufacturers."—*Burton Chronicle*.

"Should have a huge sale amongst those interested in enamelled terra cottas, ordinary and incrusted quarries, stoneware mosaics, faïences, and architectural stoneware."—*Newark Advertiser*.

"The fame of M. Lefevre's monumental work has already reached this country, and the capable translation now produced will be cordially welcomed. Apart from its technical value, the incitement which the work will give to architectural pottery is a factor that should not be ignored. . . . The chief value of the work is that all modern processes advocated are not only clearly explained, but are shown to have justified themselves. In other words, they represent the survival of the fittest."—*Manchester Courier*.

**THE ART OF RIVETING GLASS, CHINA AND EARTHENWARE.** By J. HOWARTH. Second Edition. 1900. Price 1s. net; by post, home or abroad, 1s. 2d.

### Contents.

Tools and Materials Required—Wire Used for Rivets—Soldering Solution—Preparation for Drilling—Commencement of Drilling—Cementing—Preliminaries to Riveting—Rivets to Make—To Fix the Rivets—Through-and-through Rivets—Soldering—Tinning a Soldering-Iron—Perforated Plates, Handles, etc.—Handles of Ewers, etc.—Vases and Comports—Marble and Alabaster Ware—Decorating—How to Loosen Fast Decanter Stoppers—China Cements.

**PAINTING ON GLASS AND PORCELAIN AND ENAMEL PAINTING.** A Complete Introduction to the Preparation of all the Colours and Fluxes used for Painting on Porcelain, Enamel, Faïence and Stoneware, the Coloured Pastes and Coloured Glasses, together with a Minute Description of the Firing of Colours and Enamels. On the Basis of Personal Practical Experience of the Condition of the Art up to Date. By FELIX HERMANN, Technical Chemist. With Eighteen Illustrations. 300 pp. Translated from the German. Second and Enlarged Edition. 1897. Price 10s. 6d.; India and Colonies, 11s.; Other Countries, 12s.; strictly net, post free.

### Contents.

History of Glass Painting.—Chapters I., The Articles to be Painted: Glass, Porcelain, Enamel, Stoneware, Faïence.—II., Pigments: 1, Metallic Pigments: Antimony Oxide, Naples Yellow, Barium Chromate, Lead Chromate, Silver Chloride, Chromic Oxide.—III., Fluxes: Fluxes, Felspar, Quartz, Purifying Quartz, Sedimentation, Quenching, Borax, Boracic Acid, Potassium and Sodium Carbonates, Rocaille Flux.—IV., Preparation of the Colours for Glass Painting.—V., The Colour Pastes.—VI., The Coloured Glasses.—VII., Composition of the Porcelain Colours.—VIII., The Enamel Colours: Enamels for Artistic Work.—IX., Metallic Ornamentation: Porcelain Gilding, Glass Gilding.—X., Firing the Colours: 1, Remarks on Firing: Firing Colours on Glass, Firing Colours on Porcelain: 2, The Muffle.—XI., Accidents occasionally Supervening during the Process of Firing.—XII., Remarks on the Different Methods of Painting on Glass, Porcelain, etc.—Appendix: Cleaning Old Glass Paintings.

### Press Opinions.

"Mr. Hermann, by a careful division of his subject, avoids much repetition, yet makes sufficiently clear what is necessary to be known in each art. He gives very many formulae; and his hints on the various applications of metals and metallic lustres to glass and porcelains will be found of much interest to the amateur."—*Art Amateur*, New York.



"For the unskilled and amateurs the name of the publishers will be sufficient guarantee for the utility and excellence of Mr. Hermann's work, even if they are already unacquainted with the author. . . . The whole cannot fail to be both of service and interest to glass workers and to potters generally, especially those employed upon high-class work."—*Staffordshire Sentinel*.

"In *Painting on Glass and Porcelain* the author has dealt very exhaustively with the technical as distinguished from the artistic side of his subject, the work being entirely devoted to the preparation of the colours, their application and firing. For manufacturers and students it will be a valuable work, and the recipes which appear on almost every page form a very valuable feature. The author has gained much of his experience in the celebrated Sevres manufactory, a fact which adds a good deal of authority to the work."—*Builders Journal*.

"The compiler displays that painstaking research characteristic of his nation, and goes at length into the question of the chemical constitution of the pigments and fluxes to be used in glass-painting, proceeding afterwards to a description of the methods of producing coloured glass of all tints and shades. . . . Very careful instructions are given for the chemical and mechanical preparation of the colours used in glass-staining and porcelain-painting; indeed, to the china painter such a book as this should be of permanent value, as the author claims to have tested and verified every recipe he includes, and the volume also comprises a section devoted to enamels both opaque and translucent, and another treating of the firing of porcelain, and the accidents that occasionally supervene in the furnace."—*Daily Chronicle*.

"In Dr. Hermann's hand-book—if such a term is fitting for so erudite and masterly a treatise—the student is first delighted by an interesting historical introduction, after which an exhaustive description follows of the metallic oxides and salts, the earths and earthy bodies and the free metals used in the composition of the pigments. All who take an interest in the colouring properties of matter will not fail to be instructed in this section of the work. . . . Exhaustive recipes are given in separate chapters for the composition of the colours and fluxes for every shade and tint in the painting of glass, porcelain, enamel, faience, and stone-ware, for the preparation of coloured pastes, for the application of metallic ornamentation, for the colouring of the foundation in the 'frit' or 'charge' stage, and for the encaustic operations in the kiln. . . . In every district of England where art porcelain and glass is manufactured, this treatise should be widely circulated, and its contents made familiar to all engaged, in whatever capacity, in the trade."—*Leeds Mercury*.

#### A Reissue of

## THE HISTORY OF THE STAFFORDSHIRE POTTERIES; AND THE RISE AND PROGRESS OF THE MANUFACTURE OF POTTERY AND PORCELAIN.

With References to Genuine Specimens, and Notices of Eminent Potters. By SIMEON SHAW. (Originally Published in 1829.) 235 pp. 1900. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

#### Contents.

**Introductory Chapter** showing the position of the Pottery Trade at the present time (1899).—**Chapters I., Preliminary Remarks.**—II., **The Potteries**, comprising Tunstall, Brownhills, Greenfield and New Field, Golden Hill, Latebrook, Green Lane, Burslem, Longport and Dale Hall, Hot Lane and Cobridge, Hanley and Shelton, Etruria, Stoke, Penkhull, Fenton, Lane Delf, Foley, Lane End.—III., **On the Origin of the Art**, and its Practice among the early Nations.—IV., **Manufacture of Pottery**, prior to 1700.—V., **The Introduction of Red Porcelain** by Messrs. Elers, of Bradwell, 1690.—VI., **Progress of the Manufacture from 1700 to Mr. Wedgwood's commencement in 1760.**—VII., **Introduction of Fluid Glaze.**—Extension of the Manufacture of Cream Colour.—Mr. Wedgwood's Queen's Ware.—Jasper, and Appointment of Potter to Her Majesty.—Black Printing.—VIII., **Introduction of Porcelain.** Mr. W. Littler's Porcelain.—Mr. Cookworthy's Discovery of Kaolin and Petuntse, and Patent.—Sold to Mr. Champion—resold to the New Hall Com.—Extension of Term.—IX., **Blue Printed Pottery.** Mr. Turner, Mr. Spode (1), Mr. Baddeley, Mr. Spode (2), Messrs. Turner, Mr. Wood, Mr. Wilson, Mr. Minton.—Great Change in Patterns of Blue Printed.—X., **Introduction of Lustre Pottery.** Improvements in Pottery and Porcelain subsequent to 1800.

#### Press Opinions.

"There is much curious and useful information in the work, and the publishers have rendered the public a service in reissuing it."—*Burton Mail*.

"Copies of the original work are now of considerable value, and the facsimile reprint now issued cannot but prove of considerable interest to all interested in the great industry."—*Derby Mercury*.

"The book will be especially welcomed at a time when interest in the art of pottery manufacture commands a more widespread and general interest than at any previous time."—*Wolverhampton Chronicle*.

"This work is all the more valuable because it gives one an idea of the condition of affairs existing in the north of Staffordshire before the great increase in work and population due to modern developments."—*Western Morning News*.

". . . The History gives a graphic picture of North Staffordshire at the end of the last and the beginning of the present century, and states that in 1829 there was 'a busy and enterprising community' in the Potteries of fifty thousand persons. . . . We commend it to our readers as a most entertaining and instructive publication."—*Staffordshire Sentinel*.

A Reissue of

**THE CHEMISTRY OF THE SEVERAL NATURAL  
AND ARTIFICIAL HETEROGENEOUS COM-  
POUNDS USED IN MANUFACTURING POR-  
CELAIN, GLASS AND POTTERY.** By SIMEON SHAW.  
(Originally published in 1837.) 750 pp. 1900. Price 14s.; India and  
Colonies, 15s.; Other Countries, 16s. 6d.; strictly net, post free.

**Contents.**

**PART I., ANALYSIS AND MATERIALS.**—Chapters I., **Introduction:** Laboratory and Apparatus; **Elements:** Combinative Potencies, Manipulative Processes for Analysis and Reagents, Pulverisation, Blow-pipe Analysis, Humid Analysis, Preparatory Manipulations, General Analytic Processes, Compounds Soluble in Water, Compounds Soluble only in Acids, Compounds (Mixed) Soluble in Water, Compounds (Mixed) Soluble in Acids, Compounds (Mixed) Insoluble, Particular Analytic Processes.—II., **Temperature:** Coal, Steam Heat for Printers' Stoves.—III., **Acids and Alkalies:** Boracic Acid, Muriatic Acid, Nitric Acid, Sulphuric Acid, Potash, Soda, Lithia, Calculation of Chemical Separations.—IV., **The Earths:** Alumine, Clays, Silica, Flint, Lime, Plaster of Paris, Magnesia, Barytes, Felspar, Grauen (or China Stone), China Clay, Chert.—V., **Metals:** Reciprocal Combinative Potencies of the Metals, Antimony, Arsenic, Chromium, Green Oxide, Cobalt, Chromic Acid, Humid Separation of Nickel from Cobalt, Arsenite of Cobalt, Copper, Gold, Iron, Lead, Manganese, Platinum, Silver, Tin, Zinc.

**PART II., SYNTHESIS AND COMPOUNDS.**—Chapters I., Sketch of the Origin and Progress of the Art.—II., **Science of Mixing:** Scientific Principles of the Manufacture, Combinative Potencies of the Earths.—III., **Bodies:** Porcelain—Hard, Porcelain—Fritted Bodies, Porcelain—Raw Bodies, Porcelain—Soft, Fritted Bodies, Raw Bodies, Stone Bodies, Ironstone, Dry Bodies, Chemical Utensils, Fritted Jasper, Fritted Pearl, Fritted Drab, Raw Chemical Utensils, Raw Stone, Raw Jasper, Raw Pearl, Raw Mortar, Raw Drab, Raw Brown, Raw Fawn, Raw Cane, Raw Red Porous, Raw Egyptian, Earthenware, Queen's Ware, Cream Colour, Blue and Fancy Printed, Dipped and Mocha, Chalky, Rings, Stilts, etc.—IV., **Glazes:** Porcelain—Hard Fritted, Porcelain—Soft Fritted, Porcelain—Soft Raw, Cream Colour Porcelain, Blue Printed Porcelain, Fritted Glazes, Analysis of Fritt, Analysis of Glaze, Coloured Glazes, Dips, Smears and Washes; **Glasses:** Flint Glass, Coloured Glasses, Artificial Garnet, Artificial Emerald, Artificial Amethyst, Artificial Sapphire, Artificial Opal, Plate Glass, Crown Glass, Broad Glass, Bottle Glass, Phosphoric Glass, British Steel Glass, Glass-Staining and Painting, Engraving on Glass, Dr. Faraday's Experiments.—V., **Colours:** Colour Making, Fluxes or Solvents, Components of the Colours; **Reds, etc., from Gold,** Carmine or Rose Colour, Purple, Reds, etc., from Iron, Blues, Yellows, Greens, Blacks, White, Silver for Burnishing, Gold for Burnishing, Printer's Oil, Lustres.

**PART III., TABLES OF THE CHARACTERISTICS OF CHEMICAL SUBSTANCES.**—Preliminary Remarks, Oxygen (Tables), Sulphur and its Compounds, Nitrogen ditto, Chlorine ditto, Bromine ditto, Iodine ditto, Fluorine ditto, Phosphorous ditto, Boron ditto, Carbon ditto, Hydrogen ditto, Observations, Ammonium and its Compounds (Tables), Thorium ditto, Zirconium ditto, Aluminium ditto, Yttrium ditto, Glucinum ditto, Magnesium ditto, Calcium ditto, Strontium ditto, Barium ditto, Lithium ditto, Sodium and its Compounds, Potassium ditto, Observations, Selenium and its Compounds (Tables), Arsenic ditto, Chromium ditto, Vanadium ditto, Molybdenum ditto, Tungsten ditto, Antimony ditto, Tellurium ditto, Tantalum ditto, Titanium ditto, Silicium ditto, Osmium ditto, Gold ditto, Iridium ditto, Rhodium ditto, Platinum ditto, Palladium ditto, Mercury ditto, Silver ditto, Copper ditto, Uranium ditto, Bismuth and its Compounds, Tin ditto, Lead ditto, Cerium ditto, Cobalt ditto, Nickel ditto, Iron ditto, Cadmium ditto, Zinc ditto, Manganese ditto, Observations, Isomorphous Groups, Isomeric ditto, Metameric ditto, Polymeric ditto, Index.

**Press Opinions.**

"The atomic weights have been more accurately determined, and experiments in synthetic chemistry have given us readier methods of producing certain materials requisite, but the fundamental principles were always discovered, and for all practical purposes the book is as valuable now as when first published."—*Longton Times and Echo.*

"This interesting volume has been kept from the pencil of the modern editor and reprinted in its entirety by the enterprising publishers of *The Pottery Gazette* and other trade journals. . . . There is an excellent historical sketch of the origin and progress of the art of pottery which shows the intimate knowledge of classical as well as (the then) modern scientific literature possessed by the late Dr. Shaw; even the etymology of many of the Staffordshire place-names is given."—*Glasgow Herald.*

"The historical sketch of the origin and progress of pottery is very interesting and instructive. The science of mixing is a problem of great importance, and the query how the natural products, alumina and silica can be compounded to form the best wares may be solved by the aid of chemistry instead of by guesses, as was formerly the case. This portion of the book may be most suggestive to the manufacturer, as also the chapters devoted to the subject of glazes, glasses and colours."—*Birmingham Post.*

"Messrs. Scott, Greenwood & Co. are doing their best to place before the pottery trades some really good books, likely to aid the Staffordshire manufacturers, and their spirited enterprise is worthy of encouragement, for the utility of technical literature bearing upon the



practical side of potting goes without saying. . . . They are to be congratulated on their enterprise in republishing it, and we can only hope that they will meet with the support they deserve. It seems to be a volume that is worth looking through by both manufacturers and operatives alike, and all local institutions, at any rate, should secure copies."—*Staffordshire Sentinel*.

## Paper Making.

**THE DYEING OF PAPER PULP.** A Practical Treatise for the use of Papermakers, Paperstainers, Students and others. By JULIUS ERFURT, Manager of a Paper Mill. Translated into English and Edited with Additions by JULIUS HÜBNER, F.C.S., Lecturer on Papermaking at the Manchester Municipal Technical School. With Illustrations and 157 patterns of paper dyed in the pulp. Royal 8vo, 180 pp. 1901. Price 15s.; India and Colonies, 16s.; Other Countries, 20s.; strictly net, post free. Limited edition.

### Contents.

**I., Behaviour of the Paper Fibres during the Process of Dyeing, Theory of the Mordant**—Cotton; Flax and Hemp; Esparto; Jute; Straw Cellulose; Chemical and Mechanical Wood Pulp; Mixed Fibres; Theory of Dyeing.—**II., Colour Fixing Mediums (Mordants)**—Alum; Aluminium Sulphate; Aluminium Acetate; Tin Crystals (Stannous Chloride); Cupras (Ferrous Sulphate); Nitrate of Iron (Ferric Sulphate); Pyrolignite of Iron (Acetate of Iron); Action of Tannic Acid; Importance of Materials containing Tannin; Treatment with Tannic Acid of Paper Pulp intended for dyeing; Blue Stone (Copper Sulphate); Potassium Bichromate; Sodium Bichromate; Chalk (Calcium Carbonate); Soda Crystals (Sodium Carbonate); Antimony Potassium Tartrate (Tartar Emetic).—**III., Influence of the Quality of the Water Used.**—**IV., Inorganic Colours**—**I. Artificial Mineral Colours:** Iron Buff; Manganese Bronze; Chrome Yellow (Chromate of Lead); Chrome Orange (Basic Chromate of Lead); Red Lead; Chrome Green; Blue with Yellow Prussiate; Prussian Blue; Method for Producing Prussian Blue free from Acid; Ultramarine.—**2. Natural Mineral Colours (Earth Colours):** Yellow Earth Colours; Red Earth Colours; Brown Earth Colours; Green, Grey and Black Earth Colours; White Earth Colours; White Clay (China Clay); White Gypsum; Baryta; Magnesium Carbonate; Talc, Soapstone.—**V., Organic Colours**—**1. Colours of Vegetable and Animal Origin:** (a) *Substantive (Direct Dyeing) Colouring Matters:* Annatto; Turmeric; Safflower; (b) *Adjective (Indirect Dyeing) Colouring Matters:* Redwood; Cochineal; Weld; Persian Berries; Fustic Extract; Quercitron; Catechu (Cutch); Logwood Extract.—**2. Artificial Organic (Coal Tar) Colours:** Acid Colours; Basic Colours; Substantive (Direct Dyeing) Colours; Dissolving of the Coal Tar Colours; Auramine<sup>oo</sup>; Naphthol Yellow S<sup>o</sup>; Quinoline Yellow<sup>o</sup>; Metanil Yellow<sup>o</sup>; Paper Yellow<sup>o</sup>; Azoflavine RS<sup>o</sup>, S<sup>o</sup>; Cotton Yellow Gxx and Rxx; Orange II<sup>o</sup>; Chrysoïdine A<sup>oo</sup>, RL<sup>oo</sup>; Vesuvine Extra<sup>oo</sup>; Vesuvine BC<sup>oo</sup>; Fast Brown<sup>o</sup>, Naphthylamine Brown<sup>o</sup>; Water Blue IN<sup>o</sup>; Water Blue TB<sup>o</sup>; Victoria Blue B<sup>oo</sup>; Methylene Blue MD<sup>oo</sup>; Nile Blue R<sup>oo</sup>; New Blue S<sup>oo</sup>; Indoïne Blue BB<sup>oo</sup>; Eosine 442 Nx; Phloxine BBN; Rhodamine B<sup>oo</sup>; Rhodamine 6G<sup>oo</sup>; Naphthylamine Red G<sup>o</sup>; Fast Red A<sup>o</sup>; Cotton Scarlet<sup>o</sup>; Erythrine RR<sup>o</sup>; Erythrine X<sup>o</sup>; Erythrine P<sup>o</sup>; Ponceau 2 R<sup>o</sup>; Fast Ponceau G<sup>o</sup> and B<sup>o</sup>; Paper Scarlet P<sup>oo</sup>; Saffranine PP<sup>oo</sup>; Magenta Powder A<sup>oo</sup>; Acetate of Magenta<sup>oo</sup>; Cerise D 10<sup>oo</sup>; Methyl Violet BB<sup>oo</sup>; Crystal Violet<sup>oo</sup>; Acid Violet 3 BN<sup>o</sup>, 4 R<sup>o</sup>; Diamond Green B<sup>oo</sup>; Nigrosine WL<sup>o</sup>; Coal Black<sup>oo</sup>; Brilliant Black B<sup>o</sup>.—**VI., Practical Application of the Coal Tar Colours according to their Properties and their Behaviour towards the Different Paper Fibres**—Coal Tar Colours, which rank foremost, as far as their fastness to light is concerned; Colour Combinations with which colourless or nearly colourless Backwater is obtained; Colours which do not bleed into White Fibres, for Blotting and Copying Paper Pulp; Colours which produce the best results on Mechanical Wood and on Unbleached Sulphite Wood; Dyeing of Cotton, Jute and Wool Half-stuff for Mottling White or Light Coloured Papers; Colours suitable for Cotton; Colours specially suitable for Jute Dyeing; Colours suitable for Wool Fibres.—**VII., Dyed Patterns on Various Pulp Mixtures**—Placard and Wrapping Papers; Black Wrapping and Cartridge Papers; Blotting Papers; Mottled and Marbled Papers made with Coloured Linen, Cotton and Union Rags, or with Cotton, Jute, Wool and Sulphite Wood Fibres, dyed specially for this purpose; Mottling with Dark Blue Linen; Mottling with Dark Blue Linen and Dark Blue Cotton; Mottling with Dark Blue Cotton; Mottling with Dark Blue and Red Cotton; Mottling with Dark Red Cotton; Mottling of Bleached Stuff, with 3 to 4 per cent. of Dyed Cotton Fibres; Mottling with Dark Blue Union (Linen and Wool or Cotton Warp with Wool Weft); Mottling with Blue Striped Red Union; Mottling of Bleached Stuff with 3 to 4 per cent. of Dyed Wool Fibres; Mottling of Bleached Stuff with 3 to 4 per cent. of Dyed Jute Fibres; Mottling of Bleached Stuff with 3 to 4 per cent. of Dyed Sulphite Wood Fibres; Wall Papers; Packing Papers.—**VIII., Dyeing to Shade**—Index.

### Press Opinion.

"The great feature of the volume is undoubtedly the series of actual patterns of dyed papers, 157 in all—twelve of which, made in England, have been added to the original German

series. Detailed formulæ are given for the preparation of the pulp for each, and the tints of the samples practically form a key, by means of which the accuracy of the student's or practitioner's experiments can be tested. . . . On the whole the publication is one of distinct importance to the trade, and will no doubt speedily become a standard work of reference amongst papermakers, both in the 'lab.' and the office, as well as being an excellent text-book for the use of students in the increasing number of technical institutes in which papermaking is taught."—*World's Paper Trade Review*.

## Enamelling on Metal.

**ENAMELS AND ENAMELLING.** An Introduction to the Preparation and Application of all Kinds of Enamels for Technical and Artistic Purposes. For Enamel Makers, Workers in Gold and Silver, and Manufacturers of Objects of Art. By PAUL RANDAU. Translated from the German. With Sixteen Illustrations. 180 pp. 1900. Price 10s. 6d.; India and Colonies, 11s.; Other Countries, 12s.; strictly net, post free.

### Contents.

1, Introduction.—II., Composition and Properties of Glass.—III., Raw Materials for the Manufacture of Enamels.—IV., Substances Added to Produce Opacity.—V., Fluxes.—VI., Pigments.—VII., Decolorising Agents.—VIII., Testing the Raw Materials with the Blow-pipe Flame.—IX., Subsidiary Materials.—X., Preparing the Materials for Enamel Making.—XI., Mixing the Materials.—XII., The Preparation of Technical Enamels, The Enamel Mass.—XIII., Appliances for Smelting the Enamel Mass.—XIV., Smelting the Charge.—XV., Composition of Enamel Masses.—XVI., Composition of Masses for Ground Enamels.—XVII., Composition of Cover Enamels.—XVIII., Preparing the Articles for Enamelling.—XIX., Applying the Enamel.—XX., Firing the Ground Enamel.—XXI., Applying and Firing the Cover Enamel or Glaze.—XXII., Repairing Defects in Enamelled Ware.—XXIII., Enamelling Articles of Sheet Metal.—XXIV., Decorating Enamelled Ware.—XXV., Specialities in Enamelling.—XXVI., Dial-plate Enamelling.—XXVII., Enamels for Artistic Purposes, Recipes for Enamels of Various Colours.—Index.

### Press Opinions.

"Should prove of great service to all who are either engaged in or interested in the art of enamelling."—*Jewellers and Watchmakers' Trade Advertiser*.

"I must inform you that this is the best book ever I have come across on enamels, and it is worth double its cost."—J. MINCHIN, Jr., Porto, Portugal, 22nd July, 1900.

"This is a very useful and thoroughly practical treatise, and deals with every branch of the enameller's art. The manufacture of enamels of various colours and the methods of their application are described in detail. Besides the commoner enamelling processes, some of the more important special branches of the business, such as cloisonné work are dealt with. The work is well got up, and the illustrations of apparatus are well executed. The translator is evidently a man well acquainted both with the German language and the subject-matter of the book."—*Invention*.

"This is a most welcome volume, and one for which we have long waited in this country. For years we have been teaching design applied to enamelling as well as to several other crafts, but we have not risen to the scientific side of the question. Here is a handbook dealing with the composition and making of enamels for application to metals for the most part, but also for other allied purposes. It is written in a thoroughly practical way, and its author—Paul Randau—has made its subject a very particular study. The result, like almost all things which come from the German chemical expert, is a model of good workmanship and arrangement, and no one who is in search of a handbook to enamelling, no matter whether he is a craftsman producing his beautiful translucent colours on gold, silver and copper, or the hollow-ware manufacturer making enamelled saucepans and kettles, can wish for a more useful practical manual."—*Birmingham Gazette*.

**THE ART OF ENAMELLING ON METAL.** By W. NORMAN BROWN. Twenty-eight Illustrations. 60 pp. 1900. Price 2s. 6d.; Abroad, 3s.; strictly net, post free.

### Contents.

Chapters I., History—Cloisonné—Champs Levé—Translucent Enamel—Surface Painted Enamels.—II., Cloisonné—Champs Levés—Translucent—Painted.—III., Painted Enamel—Apparatus—Furnaces and Muffles for Firing.—IV., The Copper Base or Plate—Planishing—Cloisons—Champ Levé Plates.—V., Enamels—Trituration—Washing—Coating a Plate with Enamel—Firing Ordinary Plaques for Painting—Designing—Squaring off.—VI., Designs for Cloisonné—Designs for Painted Enamels—Technical Processes—Brushes, etc.—Colours—Grisaille—Full-coloured Designs.



### Press Opinion.

"The information conveyed in *The Art of Enamelling on Metal* is as complete as can be expected in a manual of ordinary length, and is quite ample in all respects to start students in a most interesting branch of decorative art. All necessary requisites are fully described and illustrated, and the work is one, indeed, which any one may pursue with interest, for those who are interested artistically in enamels are a numerous body."—*Hardware Metals and Machinery*.

## Books on Textile and Dyeing Subjects.

**THE TECHNICAL TESTING OF YARNS AND TEXTILE FABRICS.** With Reference to Official Specifications. Translated from the German of Dr. J. HERZFELD. Sixty-nine Illustrations. 200 pp. 1898. Price 10s. 6d.; India and Colonies, 11s.; Other Countries, 12s.; strictly net, post free.

### Contents.

Yarn Testing. III., Determining the Yarn Number.—IV., Testing the Length of Yarns.—V., Examination of the External Appearance of Yarn.—VI., Determining the Twist of Yarn and Twist.—VII., Determination of Tensile Strength and Elasticity.—VIII., Estimating the Percentage of Fat in Yarn.—IX., Determination of Moisture (Conditioning).—Appendix.

### Press Opinions.

"It would be well if our English manufacturers would avail themselves of this important addition to the extensive list of German publications which, by the spread of technical information, contribute in no small degree to the success, and sometimes to the supremacy, of Germany in almost every branch of textile manufacture."—*Manchester Courier*.

"This is probably the most exhaustive book published in English on the subject dealt with. . . . We have great confidence in recommending the purchase of this book by all manufacturers of textile goods of whatever kind, and are convinced that the concise and direct way in which it is written, which has been admirably conserved by the translator, renders it peculiarly adapted for the use of English readers."—*Textile Recorder*.

"A careful study of this book enables one to say with certainty that it is a standard work on the subject. Its importance is enhanced greatly by the probability that we have here, for the first time in our own language, in one volume, a full, accurate, and detailed account, by a practical expert, of the best technical methods for the testing of textile materials, whether in the raw state or in the more or less finished product."—*Glasgow Herald*.

"The author has endeavoured to collect and arrange in systematic form for the first time all the data relating to both physical and chemical tests as used throughout the whole of the textile industry, so that not only the commercial and textile chemist, who has frequently to reply to questions on these matters, but also the practical manufacturer of textiles and his subordinates, whether in spinning, weaving, dyeing, and finishing, are catered for. . . . The book is profusely illustrated, and the subjects of these illustrations are clearly described."—*Textile Manufacturer*.

## DECORATIVE AND FANCY TEXTILE FABRICS.

With Designs and Illustrations. By R. T. LORD. A Valuable Book for Manufacturers and Designers of Carpets, Damask, Dress and all Textile Fabrics. 200 pp. 1898. 132 Designs and Illustrations. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

Chapters I., A Few Hints on Designing Ornamental Textile Fabrics.—II., A Few Hints on Designing Ornamental Textile Fabrics (continued).—III., A Few Hints on Designing Ornamental Textile Fabrics (continued).—IV., A Few Hints on Designing Ornamental Textile Fabrics (continued).—V., Hints for Ruled-paper Draughtsmen.—VI., The Jacquard Machine.—VII., Brussels and Wilton Carpets.—VIII., Tapestry Carpets.—IX., Ingrain Carpets.—X., Axminster Carpets.—XI., Damask and Tapestry Fabrics.—XII., Scarf Silks and Ribbons.—XIII., Silk Handkerchiefs.—XIV., Dress Fabrics.—XV., Mantle Cloths.—XVI., Figured Plush.—XVII., Bed Quilts.—XVIII., Calico Printing.

### Press Opinions.

"The book can be strongly recommended to students and practical men."—*Textile Colourist*  
 "Those engaged in the designing of dress, mantle tapestry, carpet and other ornamental textiles will find this volume a useful work of reference."—*Leeds Mercury*.

"The book is to be commended as a model manual, appearing at an opportune time, since every day is making known a growing desire for development in British industrial art."—*Dundee Advertiser*.

"Designers especially, who desire to make progress in their calling, will do well to take the hints thrown out in the first four chapters on 'Designing Ornamental Textile Fabrics'."—*Nottingham Daily Guardian*.

"The writer's avocation is that of a designer for the trade, and he therefore knows what he is writing about. . . . The work is well printed and abundantly illustrated, and for the author's share of the work we have nothing but commendation. It is a work which the student designer will find thoroughly useful."—*Textile Mercury*.

## POWER-LOOM WEAVING AND YARN NUMBERING,

According to Various Systems, with Conversion Tables. An Auxiliary and Text-book for Pupils of Weaving Schools, as well as for Self-Instruction and for General Use by those engaged in the Weaving Industry. Translated from the German of ANTHON GRUNER. With Twenty-six Diagrams in Colours. 150 pp. 1900. Crown 8vo. Price 7s. 6d. ; India and Colonies, 8s. ; Other Countries, 8s. 6d. ; strictly net, post free.

### Contents.

I., Power-Loom Weaving in General. Various Systems of Looms.—II., Mounting and Starting the Power-Loom. English Looms.—Tappet or Treadle Looms.—Dobbies.—III., General Remarks on the Numbering, Reeling and Packing of Yarn.—Appendix.—Useful Hints. Calculating Warps.—Weft Calculations.—Calculations of Cost Price in Hanks.

### Press Opinions.

"A long-felt want in the weaving industry has been supplied by the issue of a cheap volume dealing with the subject."—*Belfast Evening Telegraph*.

"The work has been clearly translated from the German and published with suitable illustrations. . . . The author has dealt very practically with the subject."—*Bradford Daily Telegraph*.

"The book, which contains a number of useful coloured diagrams, should prove invaluable to the student, and its handy form will enable it to become a companion more than some cumbersome work."—*Cotton Factory Times*.

"The book has been prepared with great care, and is most usefully illustrated. It is a capital text-book for use in the weaving schools or for self-instruction, while all engaged in the weaving industry will find its suggestions helpful."—*Northern Daily Telegraph*.

"The various systems are treated in a careful manner; also the different looms and their manufacture, as well as the whole processes of the work. Yarn numbering according to various systems, with conversion tables and numerous coloured diagrams, materially assist to a clear comprehension of the subject."—*Northern Whig*.

"It will be found most useful by those who have not time to go through the large standard work, and the volume may be aptly described as a nutshell of power-loom weaving. Yarn numbering according to various systems is dealt with, and conversion tables included, and we have no hesitation in commending the book to our readers."—*Oldham Standard*.

"The 'inside' managers of our textile mills in which the work is complex or greatly varied, and where yarns of different materials are in use, will find this work convenient for reference in case of novelty or difficulty. We may also say the same in relation to the textile student. Its description of the parts of the loom and their functions will be of use to the latter, being of the most elementary kind."—*Textile Mercury*.

"The author attempts to fill a gap in weaving literature caused by the neglect of many obscure points connected with the industry. A short review is given of the power-loom as a whole, followed by a description of the different parts of the machinery with their advantages and defects. . . . The book is severely technical, but must on that account be very valuable to the pupil who is determined to master this industrial art."—*Cheshire County News*.

"It is clear and concise, and gives just that knowledge in quality and amount which any student of the weaving industry ought to consider as a minimum necessary for his thorough comprehension of his future profession. The handiness and variety of the information comprised in Section III., dealing with the numbering and reeling of yarns employed in the various systems in different countries, struck us as particularly useful."—*North British Daily Mail*.

"This work brings before weavers who are actually engaged in the various branches of fabrics, as well as the technical student, the different parts of the general run of power-looms in such a manner that the parts of the loom and their bearing to each other can be readily understood. . . . The work should prove of much value, as it is in every sense practical, and is put before the reader in such a clear manner that it can be easily understood."—*Textile Industries*.

"The book under notice is intended as an instructor to those engaged in power-loom weaving, and, judging by its compilation, the author is a thorough master of the craft. It is not overloaded with details, and he manages to compress in a book of some 150 pages all that one can possibly wish to know about the different parts of the machinery, whether of English or foreign make, and for whatever kind of cloth required. A comprehensive summary is also included of the various yarns and methods of numbering them, as well as a few useful hints and a number

of coloured diagrams for mandarin weavings. The book is printed in bold, legible type, on good paper, has a copious index, and is well and strongly bound."—*Ashton-under-Lyne Herald*.

"In dealing with the complicated parts of various classes of power-loom, the writer, who is one of the professors at the Royal Weaving School of Asch, brings to the work a thorough knowledge of the subject, and, what is of great value, he has the gift of communicating his knowledge in a way which is easily understood. The smallest details of loom-setting are entered into, and a full explanation of problems, which are a source of anxiety to many engaged in overlooking, is given. Students will find the work an admirable text-book, and all who are interested in weaving will see in it a valuable addition to the literature on this subject. . . . The book is in small compass, and is crowded with valuable information."—*Bradford Observer*.

"A short and valuable review is given of the power-loom as a whole, and this is followed by a description of the mounting of the different parts of the machinery, with their advantages and defects. In preference to illustrations—the readers being presumed to already possess a suitable acquaintance with the subject—the various systems of numbering yarn are explained, together with certain calculations useful in weaving. . . . How power-loom weaving has advanced in recent years is explained at some length in this book, which will prove invaluable to intending students of practical weaving, and will also be found very useful to those whose knowledge of the subject is more advanced, to whom the calculations, which give evidence of careful study, will frequently come in handy."—*Stockport Advertiser*.

**COLOUR: A HANDBOOK OF THE THEORY OF COLOUR.** By GEORGE H. HURST, F.C.S. With Ten Coloured Plates and Seventy-two Illustrations. 160 pp. 1900. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

Chapters I., **Colour and Its Production.** Light, Colour, Dispersion of White Light Methods of Producing the Spectrum, Glass Prism and Diffraction Grating Spectroscopes, The Spectrum, Wave Motion of Light, Recomposition of White Light, Hue, Luminosity, Purity of Colours, The Polariscope, Phosphorescence, Fluorescence, Interference.—II., **Cause of Colour in Coloured Bodies.** Transmitted Colours, Absorption Spectra of Colouring Matters.—III., **Colour Phenomena and Theories.** Mixing Colours, White Light from Coloured Lights, Effect of Coloured Light on Colours, Complementary Colours, Young-Helmholtz Theory, Brewster Theory, Supplementary Colours, Maxwell's Theory, Colour Photography.—IV., **The Physiology of Light.** Structure of the Eye, Persistence of Vision, Subjective Colour Phenomena, Colour Blindness.—V., **Contrast.** Contrast, Simultaneous Contrast, Successive Contrast, Contrast of Tone, Contrast of Colours, Modification of Colours by Contrast, Colour Contrast in Decorative Design.—VI., **Colour in Decoration and Design.** Colour Harmonies, Colour Equivalents, Illumination and Colour, Colour and Textile Fabrics, Surface Structure and Colour.—VII., **Measurement of Colour.** [Colour Patch Method, The Tintometer, Chromometer.

### Press Opinions.

"This useful little book possesses considerable merit, and will be of great utility to those for whom it is primarily intended."—*Birmingham Post*.

"It will be found to be of direct service to the majority of dyers, calico printers and colour mixers, to whom we confidently recommend it."—*Chemical Trade Journal*.

"It is thoroughly practical, and gives in simple language the why and wherefore of the many colour phenomena which perplex the dyer and the colourist."—*Dyer and Calico Printer*.

"We have found the book very interesting, and can recommend it to all who wish to master the different aspects of colour theory, with a view to a practical application of the knowledge so gained."—*Chemist and Druggist*.

"Mr. Hurst's *Handbook on the Theory of Colour* will be found extremely useful, not only to the art student, but also to the craftsman, whose business it is to manipulate pigments and dyes."—*Nottingham Daily Guardian*.

"This is a workmanlike technical manual, which explains the scientific theory of colour in terms intelligible to everybody. . . . It cannot but prove both interesting and instructive to all classes of workers in colour."—*Scotsman*.

**THE COLOUR PRINTING OF CARPET YARNS.** A Useful Manual for Colour Chemists and Textile Printers. By DAVID PATERSON, F.C.S. Seventeen Illustrations. 132 pp. 1900. Price 7s. 6d.; India and Colonies, 8s. Other Countries, 8s. 6d.; strictly net, post free.



## Contents.

Chapters I., Structure and Constitution of Wool Fibre.—II., Yarn Scouring.—III., Scouring Materials.—IV., Water for Scouring.—V., Bleaching Carpet Yarns.—VI., Colour Making for Yarn Printing.—VII., Colour Printing Pastes.—VIII., Colour Recipes for Yarn Printing.—IX., Science of Colour Mixing.—X., Matching of Colours.—XI., "Hank" Printing.—XII., Printing Tapestry Carpet Yarns.—XIII., Yarn Printing.—XIV., Steaming Printed Yarns.—XV., Washing of Steamed Yarns.—XVI., Aniline Colours Suitable for Yarn Printing.—XVII., Glossary of Dyes and Dye-wares used in Wood Yarn Printing.—Appendix.<sup>3</sup>

## Press Opinions.

"The book is worthy the attention of the trade."—*Worcester Herald*.

"The treatise is arranged with great care, and follows the processes described in a manner at once clear and convincing."—*Glasgow Record*.

"A most useful manual dealing in an intelligible and interesting manner with the colour printing of carpet yarns."—*Kidderminster Times*.

"An eminent expert himself, the author has evidently strained every effort in order to make his work the standard guide of its class."—*Leicester Post*.

"The book, which is admirably printed and illustrated, should fulfil the need of a practical guide in the colour printing of carpet yarns."—*Nottingham Express*.

"The subject is very exhaustively treated in all its branches. . . . The work, which is very well illustrated with designs, machines, and wool fibres, will be a useful addition to our textile literature."—*Northern Whig*.

"It gives an account of its subject which is both valuable and instructive in itself, and likely to be all the more welcome because books dealing with textile fabrics usually have little or nothing to say about this way of decorating them."—*Scotsman*.

"The work shows a thorough grasp of the leading characteristics as well as the minutæ of the industry, and gives a lucid description of its chief departments. . . . As a text-book in technical schools where this branch of industrial education is taught, the book is valuable, or it may be perused with pleasure as well as profit by any one having an interest in textile industries."—*Dundee Courier*.

"The book bears every mark of an extensive practical knowledge of the subject in all its bearings, and supplies a real want in technical literature. Chapters IX. and X., on the science of colour mixing and colour matching respectively, are especially good, and we do not remember to have seen the bearing of various kinds of light, and of the changes from one kind of light to another on the work of the colourist, so well treated elsewhere."—*Dyer and Calico Printer*.

"It is thoroughly practical, and contains much information which has not hitherto appeared in book form. It is pleasing to note that the practical part is not crowded out with purely 'practical recipes'. A few typical examples are given, and the rest is left to the common sense and judgment of the printer or works' chemist. Another pleasing feature is the accounts given here and there of the author's own researches on the subject. The work will be of interest to printers of wool generally, and to those engaged in the dyeing of this fibre."—*Journal of the Society of Dyers and Colourists*.

## A PRACTICAL TREATISE ON THE BLEACHING OF LINEN AND COTTON YARN AND FABRICS.

By L. TAILFER, Chemical and Mechanical Engineer. Translated from the French by JOHN GEDDES McINTOSH, Lecturer on Chemical Technology, London. 1901. Price 12s. 6d.; India and Colonies, 13s. 6d.; Other Countries, 15s.; strictly net, post free.

## Contents.

Chapter I. General Considerations on Bleaching. Chapter II. Steeping. Chapter III. Washing: Its End and Importance—Roller Washing Machines—Wash Wheel (Dash Wheel)—Stocks or Wash Mill—Squeezing. Chapter IV. Lye Boiling—Lye Boiling with Milk of Lime—Lye Boiling with Soda Lyes—Description of Lye Boiling Keirs—Operations of Lye Boiling—Concentration of Lyes. Chapter V. Mather and Platt's Keir—Description of the Keir—Saturation of the Fabrics—Alkali used in Lye Boiling—Examples of Processes. Chapter VI. Soap—Action of Soap in Bleaching—Quality and Quantity of Soaps to use in the Lye—Soap Lyes or Scalds—Soap Scouring Stocks. Chapter VII. Bleaching on Grass or on the Bleaching Green or Lawn. Chapter VIII. Chemicking—Remarks on Chlorides and their Decolourising Action—Chemicking Cisterns—Chemicking—Strengths, etc. Chapter IX. Sours—Properties of the Acids—Effects Produced by Acids—Souring Cisterns. Chapter X. Drying—Drying by Steam—Drying by Hot Air—Drying by Air. Chapter XI. Damages to Fabrics in Bleaching—Yarn Mildew—Fermentation—Iron Rust Spots—Spots from Contact with Wood—Spots incurred on the Bleaching Green—Damages arising from the Machines. Chapter XII. Examples of Methods used in Bleaching—Linen—Cotton. Chapter XIII. The Valuation of Caustic and Carbonated Alkali (Soda) and General Information Regarding these Bodies—Object of Alkalimetry—Titration of Carbonate of Soda—Comparative Table of Different Degrees of Alkalimetric Strength—Five Problems relative to Carbonate of Soda—Caustic Soda, its Properties and Uses—Mixtures of Carbonated and Caustic Alkali—Note



on a Process of Manufacturing Caustic Soda and Mixtures of Caustic and Carbonated Alkali (Soda). Chapter XIV. Chlorometry—Titration—Wagner's Chlorometric Method—Preparation of Standard Solutions—Apparatus for Chlorine Valuation—Alkali in Excess in Decolourising Chlorides. Chapter XV. Chlorine and Decolourising Chlorides—Synopsis—Chlorine—Chloride of Lime—Hypochlorite of Soda—Brochoki's Chlorozone—Various Decolourising Hypochlorites—Comparison of Chloride of Lime and Hypochlorite of Soda. Chapter XVI. Water—Qualities of Water—Hardness—Dervaux's Purifier—Testing the Purified Water—Different Plant for Purification—Filters. Chapter XVII. Bleaching of Yarn—Weight of Yarn—Lye Boiling—Chemicking—Washing—Bleaching of Cotton Yarn. Chapter XVIII. The Installation of a Bleach Works—Water Supply—Steam Boilers—Steam Distribution Pipes—Engines—Keirs—Washing Machines—Stocks—Wash Wheels—Chemicking and Souring Cisterns—Various—Buildings. Chapter XIX. Addenda—Energy of Decolourising Chlorides and Bleaching by Electricity and Ozone—Energy of Decolourising Chlorides—Chlorides—Production of Chlorine and Hypochlorites by Electrolysis—Lunge's Process for increasing the intensity of the Bleaching Power of Chloride of Lime—Trilfer's Process for Removing the Excess of Lime or Soda from Decolourising Chlorides—Bleaching by Ozone.

**THE SCIENCE OF COLOUR MIXING.** A Manual intended for the use of Dyers, Calico Printers and Colour Chemists. By DAVID PATERSON, F.C.S. Forty-one Illustrations, Five Coloured Plates, and Four Plates showing Eleven Dyed Specimens of Fabrics. 1900. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

Chapters I., Colour a Sensation; Colours of Illuminated Bodies; Colours of Opaque and Transparent Bodies; Surface Colour.—II., Analysis of Light; Spectrum; Homogeneous Colours; Ready Method of Obtaining a Spectrum.—III., Examination of Solar Spectrum; The Spectroscope and Its Construction; Colourists' Use of the Spectroscope.—IV., Colour by Absorption; Solutions and Dyed Fabrics; Dichroic Coloured Fabrics in Gaslight.—V., Colour Primaries of the Scientist *versus* the Dyer and Artist; Colour Mixing by Rotation and Lye Dyeing; Hue, Purity, Brightness; Tints; Shades, Scales, Tones, Sad and Sombre Colours.—VI., Colour Mixing; Pure and Impure Greens, Orange and Violets; Large Variety of Shades from few Colours; Consideration of the Practical Primaries: Red, Yellow and Blue.—VII., Secondary Colours; Nomenclature of Violet and Purple Group; Tints and Shades of Violet; Changes in Artificial Light.—VIII., Tertiary Shades; Broken Hues; Absorption Spectra of Tertiary Shades.—Appendix: Four Plates with Dyed Specimens Illustrating Text.—Index.

### Press Opinions.

"The work has evidently been prepared with great care, and, as far as we can judge, should be very useful to the dyer and colourist."—*Halifax Courier*.

"The volume, which is clearly and popularly written, should prove of the utmost service to all who are concerned with the practical use of colours, whether as dyers or painters."—*Scotsman*.

"To the practical colourist, and also to technical students, Mr. Paterson's new work will be very welcome. We are often asked to recommend books on different subjects, and have no hesitation in advising the purchase of the present volume by dyers and calico printers, as containing a mass of most useful information at a nominal price."—*Irish Textile Journal*.

"Mr. Paterson's work not only clearly deals with the theory of colour, but supplies lucid directions for the practical application of the theory. His work will be found exceedingly helpful, not only to the practical colourist, but also to students in our textile colleges, by forming a useful complement to their class lectures. There are several exquisitely coloured plates and a large number of other illustrations of theory and practice in colour blending, and also a series of plates with specimens of dyed fabrics attached, in explication of the author's views."—*Wakefield Express*.

"Mr. Paterson has little to say upon the experimental aspect or on its æsthetics, but much upon the theory of colour, especially as it bears upon the question—an all-important one to dyers, calico printers and artists, who have to produce such a variety of shades and tints—of the admixture of one colour upon another. . . . The author is a dyer, and in his concluding chapters keeps well before him the special wants and requirements of dyers. He writes pleasantly and lucidly, and there is no difficulty in following him, although here and there a lapse into ambiguity occurs. The book is well printed, generously supplied with coloured plates, very nicely if not brightly got up; and the dyed patterns at the end enhance the value of the book to the dyer."—*Textile Mercury*.

"For some time the proprietors of *The Oil and Colourman's Journal* have been engaged in the publication of a series of practical handbooks intended for the use of those interested in certain branches of technology, and the present volume is the latest addition to their list. The feature which the works have in common—and it is an all-important one in treatises of this sort—is their eminently practical character. The primary aim of the publishers is to provide scientific text-books which will be helpful to those who are either actively engaged in

the practice of the arts in question, or who are studying with that immediate end in view. . . Mr. Paterson speaks with that assured knowledge of an expert, and in the present volume, as in that which he has already contributed to the same series, he sets forth the true foundation of the art of colouring in a manner at once comprehensive and judicious. . . For dyers, calico printers and colourists in general, whose desire it is to work with accuracy in their respective branches, the treatise will prove an invaluable guide-book, provided the principles and methods it describes are studied with intelligence and care. To this end, every encouragement has been given that well-chosen examples, carefully executed plates and diagrams, and an exhaustive index can supply."—*Glasgow Herald*.

**COLOUR MATCHING ON TEXTILES.** A Manual intended for the use of Students of Colour Chemistry, Dyeing and Textile Printing. By DAVID PATERSON, F.C.S. Coloured Frontispiece. Twenty-eight Illustrations and Fifteen Specimens of Dyed Fabrics Illustrating Text. [*In the Press*].

### Contents.

Chapters I., Colour Vision and Structure of the Eye—Perception of Colour—Primary and Complementary Colour Sensations.—II., Daylight for Colour Matching—Selection of a Good Pure Light—Diffused Daylight, Direct Sunlight, Blue Skylight, Variability of Daylight, etc., etc.—III., Matching of Hues—Purity and Luminosity of Colours—Matching Bright Hues—Aid of Tinted Films—Matching Difficulties Arising from Contrast.—IV., Examination of Colours by Reflected and Transmitted Lights—Effect of Lustre and Transparency of Fibres in Colour Matching.—V., Matching of Colours on Velvet Pile—Optical Properties of Dye-stuffs, Dichroism, Fluorescence.—VI., Use of Tinted Mediums—Orange Film—Defects of the Eye—Yellowing of the Lens—Colour Blindness, etc.—VII., Matching of Dyed Silk Trimmings and Linings and Bindings—Its Difficulties—Behaviour of Shades in Artificial Light—Colour Matching of Old Fabrics, etc.—VIII., Examination of Dyed Colours under the Artificial Lights—Electric Arc, Magnesium and Dufton, Gardner Lights, Welsbach, Acetylene, etc.—Testing Qualities of an Illuminant.—IX., Influence of the Absorption Spectrum in Changes of Hue under the Artificial Lights—Study of the Causes of Abnormal Modifications of Hue, etc.

**THE DYEING OF COTTON FABRICS: A Practical Handbook for the Dyer and Student.** By FRANKLIN BEECH. Forty-four Illustrations. [*In the Press*].

### Contents.

Chapters I., Structure and Chemistry of the Cotton Fibre.—II., Scouring and Bleaching of Cotton.—III., Dyeing Machinery and Dyeing Manipulations.—IV., Principals and Practice of Cotton Dyeing—1, Direct Dyeing; 2, Direct Dyeing followed by Fixation with Metallic Salts; 3, Direct Dyeing followed by Fixation with Developers; 4, Direct Dyeing followed by Fixation with Couplers; 5, Dyeing on Tannic Mordant; 6, Dyeing on Metallic Mordant; 7, Production of Colour Direct upon Cotton Fibres; 8, Dyeing Cotton by Impregnation with Dye-stuff Solution.—V., Dyeing Union (Mixed Cotton and Wool) Fabrics.—VI., Dyeing Half Silk (Cotton-Silk, Satin) Fabrics.—VII., Operations following Dyeing—Washing, Soaping, Drying.—VIII., Testing of the Colour of Dyed Fabrics.—IX., Experimental Dyeing and Comparative Dye Testing.—Index.

## Books for Mining Engineers and Steam Users.

**RECOVERY WORK AFTER PIT FIRES.** A Description of the Principal Methods Pursued, especially in Fiery Mines, and of the Various Appliances Employed, such as Respiratory and Rescue Apparatus, Dams, etc. By ROBERT LAMPRECHT, Mining Engineer and Manager. Translated from the German. Illustrated by Six large Plates, containing Seventy-six Illustrations. 175 pp., demy 8vo. 1901. Price 10s. 6d.; India and Colonies, 11s.; Other Countries, 12s.; strictly net, post free.

### Contents.

Preface.—1., **Causes of Pit Fires:** 1, Fires Resulting from the Spontaneous Ignition of Coal; 2, Fires Caused by Burning Timber; 3, Fires Caused by Fire-damp Explosions.—II., **Preventive Regulations:** 1, The Outbreak and Rapid Extension of a Shaft Fire can be most reliably prevented by Employing little or no Combustible Material in the Construction of the Shaft; 2, Precautions for Rapidly Localising an Outbreak of Fire in the Shaft; 3, Pre-



cautions to be Adopted in case those under 1 and 2 Fail or Prove Inefficient. Precautions against Spontaneous Ignition of Coal. Precautions for Preventing Explosions of Fire-damp and Coal Dust. Employment of Electricity in Mining, particularly in Fiery Pits. Experiments on the Ignition of Fire-damp Mixtures and Clouds of Coal Dust by Electricity.—III., **Indications of an Existing or Incipient Fire.**—IV., **Appliances for Working in Irrespirable Gases:** 1, Respiratory Apparatus; 2, Apparatus with Air Supply Pipes, (a) The Bremen Smoke Helmet, (b) The Müller Smoke Helmet, (c) The Stolz Rescue Mask; 3, Reservoir Apparatus; 4, Oxygen Apparatus. The Schwann Respiratory Apparatus. The Fleuss Respiratory Apparatus. The Improved Walcher-Gärtner Pneumatophor, (a) The Single Bottle Apparatus, Instructions for Using the Pneumatophor, Taking to Pieces and Resetting the Apparatus ready for Use; (b) Two Bottle Apparatus (Shamrock Type). The Neupert Rescue Apparatus (The Mayer-Pilar System).—V. **Extinguishing Pit Fires:** (a) Chemical Means; (b) Extinction with Water. Dragging down the Burning Masses and Packing with Clay; (c) Insulating the Seat of the Fire by Dams. Dam Building. Dam Work in the Fiery Pits of Southern Hungary: (a) Cross-dams of Clay; (b) Masonry Dams, Gallery Linings. Wagner's Portable Safety Dam. Analyses of Fire Gases. Isolating the Seat of a Fire with Dams; Working in Irrespirable Gases ("Gas-diving"): 1, Air-Lock Work (Horizontal Advance) on the Mayer System as Pursued at Karwin in 1894; 2, Air-Lock Work (Horizontal Advance) by the Mauerhofer Modified System. Vertical Advance. Mayer System. Complete Isolation of the Pit. Flooding a Burning Section isolated by means of Dams. Wooden Dams: (a) Upright Balk Dams; (b) Horizontal Balk Dams; (c) Wedge Dams, Masonry Dams. Examples of Cylindrical and Dome-shaped Dams. Dam Doors: Flooding the Whole Pit.—VI., **Rescue Stations:** (a) Stations above Ground; (b) Underground Rescue Stations.—VII., **Spontaneous Ignition of Coal in Bulk.**—Index.

### Illustrations.

Sheet I., **Respiratory and Rescue Appliances—Precautions against Fire.** Figs. 1, Smoke Helmet; 2, Müller's Smoke Helmet; 3, Low-pressure Respiration Apparatus; 4, High-pressure Respiration Apparatus; 5, The Stolz Mask for Rescue Work; 6, Precautions against Fire.—Sheet II., **Respiratory and Rescue Apparatus.** Figs. 1, Recovery Work with Müller's Smoke Helmet after a Fire; 2-8, The Fleuss Respiration Apparatus; 9, The Walcher-Gärtner Pneumatophor; 10-12, Pneumatophor (Shamrock Type).—Sheet III., **Respiratory and Rescue Apparatus—Stretchers.** Figs. 1-8, Rescue Apparatus manufactured by O. Neupert's Successor (Mayer-Pilar System); 1, Front View; 2, Section through Bag and Mask; 3, Rear View; 4, Apparatus and Mask laid out Flat (view from above); 5, Apparatus and Mask laid out Flat (view from below); 6, Locking Device for Closing Bag; 7, Apparatus Complete, Mounted for Rescue Work; 8, Improved Valve in the Respiration Tubes; 9-12, **Stretchers.** Fig. 9, Stretcher Covered with Brown Canvas; 10, Stretcher Covered with Brown Canvas, fitted with Adjustable Head-rest; 11, Folding Stretcher Covered with Brown Canvas; 12, Rupprecht's Stretcher Covered with Brown Canvas; 13, Dr. Rühlmann's Stretcher.—Sheet IV., **Dams.** Figs. 1-7, R. Wagner's Portable Safety Dam.—Sheet V., **Signalling Appliances—Dam Construction—Cable Laying.** Figs. 1-3, Signalling Appliances; 1, Small Induction Apparatus for Pit Work; 2, Bell Signal for Pit Work; 3, Pit Telephone; 4-18, **Dam Construction;** 4, 5, Upright Timber Dam; 6, 7, Timber Dam with Wooden Door; 8, 9, Dome-shaped Dams; 10, 11, Dome-shaped Dam with Iron Door; 12, 13, The Wenker and Berninghaus Locking Device for Dam Doors; 14-17, Dam Construction; 18, Damming a Gallery Lined with Iron; 19, Support for Cable.—Sheet VI., **Working with Diving Gear in Irrespirable Gases—Gallery Work.** Figs. 1-4, Air-Lock Work (Mayer System); 5-7, Air-Lock (Mauerhofer's Modification of the Mayer System); 8-11, Construction of Dams at the Pluto Shaft.—Sheet VII., **Working with Diving Gear in Irrespirable Gases (Mayer System)—Appliances in the Shaft.** Figs. 1, 2, Sections of Shaft and Air Apparatus; 3, Salzmann Reducing Valve for Reserve Air Supply; 4, 5, L. v. Bremen's Respiration Apparatus with Karwin Reserve Appliance; 6, Cross Section of the Franziska Shaft; 7, Method of Supplying Air to Main Pipe and Winding same on Drum; 8, Clamp.

### Press Opinions.

"This book is, in a manner, unique. The literature of mining accidents is fairly extensive, but it consists largely of departmental Blue Books."—*Sheffield Daily Telegraph.*

"A concise and lucid description of the principal methods pursued, especially in fiery mines, and of the various appliances employed, such as respiratory and rescue apparatus, dams, etc."—*Staffs Advertiser.*

"The prevention of spontaneous combustion in collieries and the extinction of underground fires are duties that fall heavily on many colliery managers. They should, therefore, welcome this translation of Mr. Lamprecht's German treatise."—*Ironmonger.*

"The book under notice supplies the needed full description, drawings, and mode of using these new appliances in actual fires, and should be studied by every colliery manager, seeing that even our best managed collieries have not been free from fires, more or less disastrous to life and property."—*Colliery Manager.*

"Herr Lamprecht has collated such a vast mass of useful information that it can never fail to be of utility to the mine manager, even though, on occasion, it should only be in the direction of inducing measures to prevent a recurrence of similar calamities."—*Newcastle Chronicle.*

"It is the only existing work which deals exclusively with the branch of the miner's art indicated by its title. . . . The author presents his subject in a clear, practical manner, and seems to leave nothing unexplained that is necessary to make the book a thoroughly useful and easily assimilated authority, on which pit managers and others may rely for guidance in case of catastrophe."—*Wigan Examiner.*

**GAS AND COAL DUST FIRING.** A Critical Review of the Various Appliances Patented in Germany for this purpose since 1885. By ALBERT PÜTSCH. 130 pp., demy 8vo. 1901. Translated from the German. With 103 Illustrations. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

Generators—Generators Employing Steam—Stirring and Feed Regulating Appliances—Direct Generators—Burners—Regenerators and Recuperators—Glass Smelting Furnaces—Metallurgical Furnaces—Pottery Furnace—Coal Dust Firing.

### Press Opinions.

"The work is worthy of perusal by all consumers of fuel. It is exceedingly well printed and illustrated."—*Chemical Trade Journal*.

"The book will appeal with force to the manufacturer as well as to the technical student, whilst it is also of far more than average interest to the general reader."—*Halifax Guardian*.

"The importance that gas and coal dust firing have attained of recent years, and especially the great interest attaching of late to the question of coal dust firing, makes the appearance of the present volume most opportune."—*Iron and Coal Trades Review*.

"The German author has long followed the development of various systems of gas firing, and in the present treatise he discusses the merits of appliances patented since 1885. His text and the numerous illustrations indispensable to it will be found useful by all who are engaged in practical work in the same field."—*North British Daily Mail*.

"It has been a pleasure to read this little book, and though the author has to admit on the last page that 'no important novel ideas have appeared of late in connection with the subject of gas firing,' one feels that the translation has not been made in vain. . . . The volume forms a useful aid to the would-be inventor of generators, as it warns him what to avoid and gives some hints as to what to aim at."—*Gas World*.

## Books on Plumbing, Decorating, Metal Work, etc., etc.

**EXTERNAL PLUMBING WORK.** A Treatise on Lead Work for Roofs. By JOHN W. HART, R.P.C. 180 Illustrations. 270 pp. 1896. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

Chapters I., Cast Sheet Lead.—II., Milled Sheet Lead.—III., Roof Cesspools.—IV., Socket Pipes.—V., Drips.—VI., Gutters.—VII., Gutters (continued).—VIII., Breaks.—IX., Circular Breaks.—X., Flats.—XI., Flats (continued).—XII., Rolls on Flats.—XIII., Roll Ends.—XIV., Roll Intersections.—XV., Seam Rolls.—XVI., Seam Rolls (continued).—XVII., Tack Fixings.—XVIII., Step Flashings.—XIX., Step Flashings (continued).—XX., Secret Gutters.—XXI., Soakers.—XXII., Hip and Valley Soakers.—XXIII., Dormer Windows.—XXIV., Dormer Windows (continued).—XXV., Dormer Tops.—XXVI., Internal Dormers.—XXVII., Skylights.—XXVIII., Hips and Ridging.—XXIX., Hips and Ridging (continued).—XXX., Fixings for Hips and Ridging.—XXXI., Ornamental Ridging.—XXXII., Ornamental Curb Rolls.—XXXIII., Curb Rolls.—XXXIV., Cornices.—XXXV., Towers and Finials.—XXXVI., Towers and Finials (continued).—XXXVII., Towers and Finials (continued).—XXXVIII., Domes.—XXXIX., Domes (continued).—XL., Ornamental Lead Work.—XLI., Rain Water Heads.—XLII., Rain Water Heads (continued).—XLIII., Rain Water Heads (continued).

### Press Opinions.

"This is an eminently practical and well-illustrated volume on the management of external ead work."—*Birmingham Daily Post*.

"It is thoroughly practical, containing many valuable hints, and cannot fail to be of great benefit to those who have not had large experience."—*Sanitary Journal*.

"Works on sanitary plumbing are by no means rare, but treatises dealing with external plumbing work are sufficiently scarce to ensure for Mr. Hart's new publication a hearty reception."—*The Ironmonger*.

"With Mr. Hart's treatise in his hands the young plumber need not be afraid of tackling outside work. He would do well to study its pages at leisure, so that he may be ready for it when called upon."—*Ironmongery*.

"The publication of this book will do much to stimulate attention and study to external plumbing work, for it is a book which we can heartily recommend to every plumber, both old and young, who desires to make himself proficient in the several branches of his trade. We can heartily recommend the book to plumbers and architects."—*Sanitary Record*.



## HINTS TO PLUMBERS ON JOINT WIPING, PIPE BENDING AND LEAD BURNING. Third Edition,

Revised and Corrected. By JOHN W. HART, R.P.C. 184 Illustrations. 313 pp. 1901. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

### Contents.

Introduction.—Chapters I., Pipe Bending.—II., Pipe Bending (continued).—III., Pipe Bending (continued).—IV., Square Pipe Bendings.—V., Half-circular Elbows.—VI., Curved Bends on Square Pipe.—VII., Bossed Bends.—VIII., Curved Plinth Bends.—IX., Rain-water Shoes on Square Pipe.—X., Curved and Angle Bends.—XI., Square Pipe Fixings.—XII., Joint-wiping.—XIII., Substitutes for Wiped Joints.—XIV., Preparing Wiped Joints.—XV., Joint Fixings.—XVI., Plumbing Irons.—XVII., Joint Fixings.—XVIII., Use of "Touch" in Soldering.—XIX., Underhand Joints.—XX., Blown and Copper Bit Joints.—XXI., Branch Joints.—XXII., Branch Joints (continued).—XXIII., Block Joints.—XXIV., Block Joints (continued).—XXV., Block Fixings.—XXVI., Astragal Joints—Pipe Fixings.—XXVII., Large Branch Joints.—XXVIII., Large Underhand Joints.—XXIX., Solders.—XXX., Autogenous Soldering or Lead Burning.—Index.

### Press Opinions.

"Rich in useful diagrams as well as in hints."—*Liverpool Mercury*.

"The papers are eminently practical, and go much farther into the mysteries they describe than the title 'Hints' properly suggests."—*Scotsman*.

"The articles are apparently written by a thoroughly practical man. As a practical guide the book will doubtless be of much service."—*Glasgow Herald*.

"A well got-up and well-done practical book. It is freely illustrated and is a reliable help in respect of some of the most awkward work the young plumber has to perform."—*The Ironmonger*.

"So far as the practical hints in this work are concerned, it will be useful to apprentices and students in technical schools, as it deals mainly with the most important or difficult branches of the plumber's craft, *viz.*, joint wiping, pipe bending and lead burning. . . . 'Hints' are the most useful things to an apprentice, and there are many in this work which are not to be found in some of the text-books."—*English Mechanic*.

"It is a book for the intelligent operative first of all, not a mere manual of instruction for the beginner, nor yet a scientific treatise on the whole art of sanitary plumbing. The special subject with which it deals is joint-making, the most important branch of the operative's work, and into this topic the author goes with a thoroughness that is full of suggestion to even the most experienced workman. There is no one who has to do with plumbing but could read the book with profit."—*Ironmongery*.

"22 PRYME STREET, HULL, 24th November, 1894.

"Gentlemen,—Your books to hand for which accept my best thanks, also for circulars. I myself got one of J. W. Hart's books on Plumbing from your traveller, and having looked through the same I can safely recommend it as being the best book I have seen. Mr. J. W. Hart treats exhaustively upon soldering and pipe bending, which are two of the most essential branches in the plumbing trade."

## THE PRINCIPLES AND PRACTICE OF DIPPING, BURNISHING, LACQUERING AND BRONZING BRASS WARE. By W. NORMAN BROWN. 35 pp. 1900.

Price 2s.; Abroad, 2s. 6d.; strictly net, post free.

### Contents.

Chapters I., Cleansing and Dipping; Boiling up and Cleansing; Dipping.—II., Scratch-brushing and Burnishing; Polishing; Burnishing.—III., Lacquering; Tools; Lacquers.—IV., Bronzing; Black Bronzing; Florentine Red Bronzing; Green Bronzing.—Index.

### Press Opinions.

"Mr. Brown is clearly a master of his craft, and has also the immense advantage of being able to convey his instructions in a manner at once clear and concise."—*Leicester Post*.

"A thoroughly practical little treatise on the subject in all its branches, and one which should be in the hands of every tradesman or amateur who has lacquering to do."—*Irish Builder*.

"A successful endeavour has been made to show in the course of four chapters of comparatively few words the most scientific and economical methods of treating brass ware. . . . The book is prefaced with a contents list, and concludes with a complete index. It is substantially bound, and should prove invaluable to gasfitters, decorators and ironmongers in country towns, who at spring time and during the redecorating of a house undertake the work of renovating the brass fittings."—*Hardwareman*.

**HOUSE DECORATING AND PAINTING.** By W. NORMAN BROWN. Eighty-eight Illustrations. 150 pp. 1900. Price 3s. 6d.; India and Colonies, 4s.; Other Countries, 4s. 6d.; strictly net, post free.

#### Contents.

Chapters I., Tools and Appliances.—II., Colours and Their Harmony.—III., Pigments and Media.—IV., Pigments and Media.—V., Pigments and Media.—VI., Pigments and Media.—VII., Preparation of Work, etc.—VIII., Application of Ordinary Colour.—IX., Graining.—X., Graining.—XI., Graining.—XII., Gilding.—XIII., Writing and Lettering.—XIV., Sign Painting.—XV., Internal Decoration.—Index.

#### Press Opinion.

"The author is evidently very thoroughly at home in regard to the technical subjects he has set himself to elucidate, from the mechanical rather than the artistic point of view, although the matter of correctness of taste is by no means ignored. Mr. Brown's style is directness itself, and there is no tyro in the painting trade, however mentally ungifted, who could fail to carry away a clearer grasp of the details of the subject after going over the performance."—*Building Industries*.

**A HISTORY OF DECORATIVE ART.** By W. NORMAN BROWN. Thirty-nine Illustrations. 96 pp. 1900. Price 2s. 6d.; Abroad, 3s.; strictly net, post free.

#### Contents.

Chapters I., Primitive and Premistoric Art.—II., Egyptian Art.—III., Assyrian Art.—IV., The Art of Asia Minor.—V., Etruscan Art.—VI., Greek Art.—VII., Roman Art.—VIII., Byzantine Art.—IX., Lombard or Romanesque Art.—X., Gothic Art.—XI., Renaissance Art.—XII., The Victorian Period.—Index.

#### Press Opinion.

"In the course of a hundred pages with some forty illustrations Mr. Brown gives a very interesting and comprehensive survey of the progress and development of decorative art. It cannot, of course, be pretended that in the limited space named the subject is treated exhaustively and in full detail, but it is sufficiently complete to satisfy any ordinary reader; indeed, for general purposes, it is, perhaps, more acceptable than a more elaborate treatise."—*Midland Counties Herald*.

**THE PRINCIPLES OF HOT WATER SUPPLY.** By JOHN W. HART, R.P.C. With 129 Illustrations. 1900. 177 pp., demy 8vo. Price 7s. 6d.; India and Colonies, 8s.; Other Countries, 8s. 6d.; strictly net, post free.

#### Contents.

Chapters I., Water Circulation.—II., The Tank System.—III., Pipes and Joints.—IV., The Cylinder System.—V., Boilers for the Cylinder System.—VI., The Cylinder System.—VII., The Combined Tank and Cylinder System.—VIII., Combined Independent and Kitchen Boiler.—IX., Combined Cylinder and Tank System with Duplicate Boilers.—X., Indirect Heating and Boiler Explosions.—XI., Pipe Boilers.—XII., Safety Valves.—XIII., Safety Valves.—XIV., The American System.—XV., Heating Water by Steam.—XVI., Steam Kettles and Jets.—XVII., Heating Power of Steam.—XVIII., Covering for Hot Water Pipes.—Index.

#### Press Opinion.

"If all plumbers were to read this book, and if they followed the instructions given, there would, we are sure, be fewer accidents from household boiler explosions, and many lives might be saved. No doubt the majority of householders know or care little about the subject, but any one who wishes to adopt the most up-to-date system of supplying hot water throughout his house will be able to do so if he reads Mr. Hart's book and follows the instruction given. It is a work that all who have charge of domestic water supply should study. It is a practical and profitable book."—*Wigan Observer*.

# Brewing and Botanical.

**HOPS IN THEIR BOTANICAL, AGRICULTURAL AND TECHNICAL ASPECT, AND AS AN ARTICLE OF COMMERCE.** By EMMANUEL GROSS, Professor at the Higher Agricultural College, Tetschen-Liebwerd. Translated from the German. Seventy-eight Illustrations. 1900. 340 pp Price 12s. 6d.; India and Colonies, 13s. 6d.; Other Countries, 15s.; strictly net, post free.

## Contents.

### PART I., HISTORY OF THE HOP.

PART II., THE HOP PLANT. Introductory.—The Roots.—The Stem and Leaves.—Inflorescence and Flower: Inflorescence and Flower of the Male Hop; Inflorescence and Flower of the Female Hop.—The Fruit and its Glandular Structure: The Fruit and Seed.—Propagation and Selection of the Hop.—Varieties of the Hop: (a) Red Hops; (b) Green Hops; (c) Pale Green Hops.—Classification according to the Period of Ripening: 1. Early August Hops; 2. Medium Early Hops; 3. Late Hops.—Injuries to Growth: Malformations; Diseases Produced by Conditions of Soil and Climate: 1. Leaves Turning Yellow, 2. Summer or Sun-brand, 3. Cones Dropping Off, 4. Honey Dew, 5. Damage from Wind, Hail and Rain; Vegetable Enemies of the Hop; Animal Enemies of the Hop.—Beneficial Insects on Hops.

PART III., CULTIVATION. The Requirements of the Hop in Respect of Climate, Soil and Situation: Climate; Soil; Situation.—Selection of Variety and Cuttings.—Planting a Hop Garden: Drainage; Preparing the Ground; Marking-out for Planting; Planting; Cultivation and Cropping of the Hop Garden in the First Year.—Work to be Performed Annually in the Hop Garden: Working the Ground; Cutting; The Non-cutting System; The Proper Performance of the Operation of Cutting: I. Method of Cutting: Close Cutting, Ordinary Cutting, The Long Cut, The Topping Cut; II. Proper Season for Cutting: Autumn Cutting, Spring Cutting; Manuring; Training the Hop Plant: Poled Gardens, Frame Training; Principal Types of Frames: Pruning, Cropping, Topping, and Leaf Stripping the Hop Plant; Picking, Drying and Bagging.—Principal and Subsidiary Utilisation of Hops and Hop Gardens.—Life of a Hop Garden; Subsequent Cropping.—Cost of Production, Yield and Selling Prices.

PART IV.—Preservation and Storage.—Physical and Chemical Structure of the Hop Cone.—Judging the Value of Hops.

PART V.—Statistics of Production.—The Hop Trade.—Index.

## Press Opinions.

"The subject is dealt with fully in every little detail; consequently, even the veriest tyro can take away some useful information from its pages."—*Irish Farming World*.

"Farmers are but little given to reading; but nowadays brewers have to study their trade and keep abreast of its every aspect, and as far as regards our trade, to them this book especially appeals, and will be especially useful."—*Licensed Victuallers' Gazette*.

"Like an oasis in the desert comes a volume upon the above subject, by the Professor at the Higher Agricultural College, Tetschen-Liebwerd, Germany, who has been fortunate enough to obtain an excellent translator from the German in the person of Mr. Charles Salter. The paucity of works upon the history and cultivation of hops is surprising considering the scope it gives for an interesting and useful work."—*Hereford Times*.

"We can safely say that this book deals more comprehensively and thoroughly with the subject of hops than any work previously published in this country. . . . No one interested in the hop industry can fail to extract a large amount of information from Professor Gross's pages, which, although primarily intended for Continental readers, yet bear very closely on what may be termed the cosmopolitan aspects of the science of hop production."—*South Eastern Gazette*.

"This is, in our opinion, the most scholarly and exhaustive treatise on the subject of hops, their culture and preservation, etc., that has been published, and to the hop grower especially will its information and recommendations prove valuable. Brewers, too, will find the chapter devoted to 'Judging the Value of Hops' full of useful hints, while the whole scope and tenor of the book bear testimony to the studious and careful manner in which its contents have been elaborated."—*Brewers' Journal*.

[See next Page.]



"Considering the extent to which this country draws its hop supplies from abroad, this translation of Professor Gross's volume will prove an interesting and instructive addition to the library of any brewer or brewers' chemist, the more so as the work of translation has been admirably carried out in simple and vigorous English. . . . The volume is one of a valuable series of special technical works for trades and professions the publishers are issuing, and is the first so far dealing with the brewing industry."—*Burton Mail*.

"A work upon the above subject must be welcomed if for no other reason than the dearth of books dealing with so interesting a theme, but fortunately apart from this the book will afford excellent reading to all interested in hops and their culture. Professor Gross takes one over the whole field, by commencing with the earliest history of the plant—so far back as the days of ancient Greece—and from both practical, theoretical and scientific standpoints, deals with the cultivation, classification and formation of the hop. . . . In speaking of the production of new varieties sound information is given, and should be of value to those who are always in search of improvements."—*Hereford Journal*.

"This work is, without doubt, the most thorough and extensive compilation on hops ever yet offered to the public, and for this reason should be warmly welcomed and appreciated by men interested in the subject. Although primarily written for those engaged in the industry abroad, and mainly Continental in theory and practice, it nevertheless appeals to those connected with the hop growing and brewing business in England, not only by way of a comparison, but also as an instruction. The volume is at once practical and scientific, is well got up, and teems with illustrations and statistics. In a word, it is a book that should find its way into the hands of all who are occupied in hop production and distribution at home; and it also contains valuable information and suggestions for the brewers themselves."—*Brewers' Guardian*.

"The value of a comprehensible and reliable text-book must be clearly apparent to every scientific hop grower, and in this county of Kent—the chief hop-producing district of England, for over 400,000 cwts. were grown here last season alone—its advice regarding the cultivation, preservation and storage of the cones will be found extremely useful. Year by year scientific education is becoming more and more essential to the training—in common with the remainder of agriculturalists—of the hop planter. Continental and American competition, the higher price and scarcity of hand labour and many other causes make it necessary that the utmost should be extracted from a limited area of land. To accomplish this end all sorts of devices must be resorted to in the matter of cultivation. The lesson imparted in this treatise deals exhaustively with these 'devices'. And therein lies the basis of its value: whereas one man's life is 'made up of fails and successes,' here is to be found the collective successes, tabulated results and logical inferences drawn from sources extending over the whole hop-growing area of the world."—*Kentish Gazette*.

## Public Libraries.

**BRITISH LIBRARY YEAR BOOK, 1900-1901.** A Record of Library Progress and Work. 54 Illustrations. Crown 8vo, 345 pp. 1900. Edited by THOMAS GREENWOOD. Price 3s.; abroad, 3s. 6d.; strictly net, post free.

### Contents.

Notes for Library Committees. Contributed Articles: The Library Rate. Some Points in Library Planning—Mr. Burgoyne. Library Classification—Mr. Jast. Developments in Library Cataloguing—Mr. Quinn. Children and Public Libraries—Mr. Ballinger. Fire Prevention and Insurance—Mr. Davis. The Educational Work of the Library Association—Mr. Roberts. The Library Assistants' Association—Mr. Chambers. British Municipal Libraries established under the various Public Libraries or Special Acts, and those supported out of Municipal Funds, giving particulars of Establishment, Organisation, Staff, Methods and Librarians. Table showing the Rate, Income, Work and Hours of the Rate-supported Libraries. Statistical Abstracts. British non-Municipal Libraries, Endowed, Collegiate, Proprietary and others, showing date of Establishment, number of Volumes, Particulars of Administration, and Librarians. Library Associations and Kindred Societies.

### Press Opinions.

"The book promises to be a really useful compendium of information which ought to be of importance to everybody."—*Athenæum*.

"This valuable reference book is in every respect what a year book should be. . . . The production of the volume is excellent."—*Newsagent, Bookseller and Stationer*.

"This is a handbook which tells the reader everything about public libraries, great and small, in the United Kingdom. . . . The book is decidedly one of the best arranged volumes ever published, and there is no doubt that the editor has been at great pains to obtain the latest and most accurate information from all places. County, district and parish councils, ministers of religion, and schoolmasters everywhere should make themselves acquainted with its contents. Its perusal cannot fail to serve the ends of the library movement. The illustrations, of which there is a large number, are very good."—*Western (Cardiff) Mail*.



## WORKS IN PREPARATION.

**AGRICULTURAL CHEMISTRY.** By HERBERT INGLE, of the Yorkshire College, Leeds.

**TREATISE ON CLOTH FINISHING.** By ROBERT BEAUMONT, of Yorkshire College, Leeds.

**INDIA-RUBBER; GUTTA PERCHA.**

**THE EXAMINATION OF MATERIALS USED IN DYEING.** By P. HEERMANN.

**EVAPORATION, CONDENSATION AND COOLING.** Calculations of Dimensions of Apparatus. By E. HAUSBRAND. Tables. For Chemists, Chemical and Mechanical Engineers.

**THE CHEMISTRY OF SPINNING.** Spinning, Washing, Bleaching, Dyeing, Printing and Finishing. By Dr. G. VON GEORGIEVICS.

**A TREATISE ON THE CERAMIC INDUSTRY.** By EMILLE BOURRY. Translated and Edited by WILTON P. RIX, Ceramic Specialist. *[In the Press.]*

**WEAVING MACHINERY.** Three Vols. By HARRY NISBET.

**COTTON COMBING MACHINES AND ALLIED PROCESSES.** By THOS. THORNLEY.

**COTTON SPINNING.** Series of Questions and Answers. With Notes. By THOS. THORNLEY.

**THE CHEMISTRY OF PIGMENTS.** By E. J. PARRY, B.Sc., etc.

**TEXTILE RAW MATERIALS AND THEIR PREPARATION FOR SPINNING.**

**ANALYSIS OF RESINS AND BALSAMS.** *[In the Press.]*

**WRINKLES FOR PAINTERS, DECORATORS, PAPER-HANGERS AND OTHERS.** By W. N. BROWN.

**SMOKE PREVENTION.** By W. C. POPPLEWELL.

**COLOUR TERMS: THEIR PROPER USE AND MEANING.** By DAVID PATERSON.

**LEAD AND ITS COMPOUNDS.** By THOS. LAMBERT.

---

*The Publishers will advise when any of the above books are ready to firms sending their addresses.*

## *SCOTT, GREENWOOD AND CO.*

are Publishers of the following old-established and well-known  
Trade Journals:—

**THE OIL AND COLOURMAN'S JOURNAL.** The Organ of the Oil, Paint, Drysaltery and Chemical Trades. Home Subscription, 7s. 6d. per year; United States, \$2; Other Countries, 10s. per year.

**THE POTTERY GAZETTE.** For the China and Glass Trades. Home Subscription, 7s. 6d. per year; United States, \$2; Other Countries, 10s. per year.

**THE HATTERS' GAZETTE.** Home Subscription, 6s. 6d. per year; Foreign Subscription, 9s. per year.

**THE DECORATORS' GAZETTE AND PLUMBERS' REVIEW.** Home Subscription, 6s. 6d. per year; Foreign Subscription, 9s. per year.

**19 Ludgate Hill, London, E.C.**



UNIVERSITY OF CALIFORNIA  
LIBRARY

---

This is the date on which this  
book was charged out.

DUE 2 WEEKS LATER DATE.  
OCT 22 1912

MAY 13 1942U



YB 15570

Faimie

104583

TN450

FZ

