

AN ARTIFICIAL STONE.

ACCORDING to *Dingler's Polytechnic Journal* a patent has been recently granted in Germany to Dr. Ternikow for the production of artificial stone, the chief constituents of which, sand and slaked lime, are known to show great resistance to atmospheric influences. By boiling (according to the patentee), a combination of silica and lime takes place; and the hardness of the mortar, petrified by aqueous vapor, even increases by absorption of carbonic acid from the air. Specimens showed throughout the hardness of good natural sandstone; they were about a year old, and must have gained in hardness, for shortly after casting they could still be cut with the knife. Cracks and fissures were nowhere observed, and are hardly to be expected in future, as the combination of lime and sand, under the action of hot water, is effected only at such low temperatures (between 250° and 300° Fahr.) that a reduction of hydrate of lime to free caustic lime cannot have taken place. As regards the cost of production, the price of the raw materials—eighty to ninety per cent. sand, and ten to twenty per cent. slaked lime—will scarcely be higher than that of clay for bricks. The time of heating is nearly the same in both cases, but while the temperature required for bricks is nearly a white heat, 300° Fahr. is sufficient for the mortar stone; thus there is considerable saving in fuel. The mode of forming the prism-shaped stones is similar to that of machine-made bricks where they are pressed through a mouthpiece.

GALLEINE AND CÆRULEINE.

By M. DURAND.

GALLEINE and cæruleine, new coloring matters derived from pyrogallol acid, were discovered by Baeyer, who published their reactions in 1871. Since that date no important publication on the subject has been made; indeed, Baeyer described the preparation and the properties of these compounds with such distinctness that the work was complete from the very outset.

Three years after this publication the firm of L. Durand & Huguenin, of Bâle, undertook the manufacture of these products, and sent its first samples in June, 1874, to M. Horace Kœchlin. The result of his researches was that the oxide of chrome was the best mordant for galleine and cæruleine, and that both for dyeing and printing the latter ought to be mixed with bisulphite of soda.

Galleine.—Galleine is obtained by the reaction of phthalic acid upon twice its weight of pyrogallol acid. The mixture is kept at 374° to 392° Fahr. till the mass hardens. The crude product of this reaction is treated with boiling water in order to extract portions of pyrogallol and of phthalic acid which have escaped conversion. The product is dissolved by the aid of an alkaline carbonate, and precipitated with an acid, and is thus obtained in the paste-like state necessary for its use as an application color.

Galleine is sparingly soluble in boiling water, to which it nevertheless imparts a vinous red tint; it is, practically speaking, insoluble in cold water, but dissolves very freely in hot alcohol, the concentrated solution being of a mahogany color. Caustic alkalis dissolve it with a blue violet color. These concentrated solutions are rapidly transformed in contact with the air; they lose their blue color and deposit brown matters.

Galleine is variously affected by the metallic acids. The oxide which gives the most beautiful shades is chromic oxide, as M. Horace Kœchlin directs in the subjoined receipt for a steam color:

Galleine in paste.....	35 quarts.
Gum water	17½ "
Acetate of chrome at 18° B	1½ quart.

Care must be taken to print both galleine and cæruleine upon cloth prepared with sulpholeate of ammonia.

Galleine dyes both cotton and wool equally well, provided the fiber is saturated with oxide of chrome.

This is easily effected by mordanting with chrome alum, or by taking alternately through chromate of potash and bisulphite of soda, or over the fumes of burning sulphur.

Cotton mordanted with oxide of lead dyes up also a very fine violet gray color. The dyeing, after mordanting, is done as with madder, adding to a water the quantity of ware necessary to obtain the shade, and gradually raising the temperature to a boil. After dyeing, the shade may be developed by a hot soaping. These colors have a solidity only rivaled by madder and indigo.

Upon wool galleine gives in printing the color of extract of orchil, though a little less blue. With the addition, however, of methyl violet or of alum similar tones may be obtained. At present the price of galleine is too high, as compared with the price of extract of orchil. This application of the new color, therefore, offers no practical interest.

Cæruleine.—This green coloring matter is a derivative of galleine, and both in its use and its properties it presents the same peculiarities, requiring the same mordants and the same precautions in dyeing and printing.

Its insolubility in water is still greater than that of galleine, and it is necessary to develop it by a slight reduction, which M. Horace Kœchlin obtains by the addition of bisulphite of soda, either in the dye-beck or in the mixed color for printing. The following is the color for printing as directed by this chemist:

For Wool—	
Cæruleine.....	17½ pints.
Gum water	52½ "
Glycerine.....	52½ fl. ozs.
Bisulphite of soda.....	34 "

The last article is added only the moment before it is used.

For Cotton—	
Gum water	17½ quarts.
Cæruleine	7 "
Bisulphite of soda.....	1¾ pint.
(To be added on using)—	
Acetate of chrome (at 18° B.).....	3½ pints.

With additions of alizarine berries (or any other yellow color) or of catechu these receipts may be converted into bronzes, olives, mosses, etc., which, as compared with aniline greens and logwood, have an advantage in solidity which the makers of furniture prints fully appreciate. These new colors can be used with the greatest ease in resist styles.

M. Kœchlin recommends also in printing, as a mordant, yellow prussiate, which may be used at most in the proportion of 8½ ozs. of prussiate per 1½ pint of cæruleine. This maximum quantity gives shades rather too blue, due to the simultaneous development of Prussian blue, which disappears on soaping, and leaves a tone more gray, but of an intensity proportionally greater than that which is fixed with oxide of chrome.

For dyeing wool and cotton exactly the same procedures are required as for galleine, only to obtain good results the cæruleine should be stirred up with 4 lbs. 6 ozs. bisulphite of soda, at 40° Baumé, to 2 lbs. 3 ozs. of cæruleine. It is even recommended to let this mixture stand for some hours before adding it to the dye-beck.

Cæruleine has the property of becoming reduced like indigo, and of reoxidizing itself on exposure to the air, resuming its original color upon tissues saturated with the product of reduction, which permits this means to be used either for printing or dyeing. The best reducing agent is zinc powder, along with a little ammonia.

The dyes and impressions obtained with cæruleine are very fast as regards air and soap, which they resist as well as do the alizarine colors. The cloth manufacture will doubtless find in this an excellent tinctorial agent for dark green cloths which require great solidity.

Cæruleine is obtained by the action of concentrated sulphuric acid upon galleine. For this purpose 1 part of dry galleine is heated with 20 parts of sulphuric acid to 392° Fahr. The product of the reaction is run into water, and washed until perfectly neutral.

Cæruleine is affected neither by the caustic alkalis nor by acids. It is the only green dye, natural or artificial, which presents these precious qualities.—*Bull. de la Soc. Ind. de Mulhouse.*

OZOKERITE.

At the Vienna Exhibition of 1873 was met with for the first time an interesting substitute for beeswax, ceresine, or mineral wax, which was exhibited by three Austrian firms. In the official report it was actually stated that this article was a mixture of common beeswax with more or less paraffine. This misstatement has not prevented other establishments from entering upon the manufacture of this substance, which is capable of serving as a substitute for beeswax in all its technical applications. The raw material for ceresine is ozokerite, otherwise known as earth wax, which is found chiefly in Galicia, on the northern slope of the Carpathians, besides in Moldavia, Hungary, England, and Russia, but the first place is the only source of importance, as far as the manufacture of mineral wax is concerned. At Boryslaw, the main place of production, ozokerite is raised from about 2,000 mines, though at one time 12,000 are said to have existed, which are all arranged and worked in the most primitive manner, and with incredible negligence.

The ozokerite is found in masses or beds of variable thickness, between clay and a sandy shale, and varies in color from yellow and greenish brown to black brown. The raw ozokerite is first, in order to free it from earthy and stony matter, melted over an open fire, or by steam, and is then known as prim-wax. The purest kinds are used for preparing ceresine, while inferior qualities are worked up for paraffine. The manufacture of ceresine consists in heating prim-wax with one-fifth of its weight of sulphuric acid at a temperature of 284° to 320° Fahr. After complete removal of the acid it is smelted with the carbonaceous residues from the prussiate of potash works, and the mass while still fluid is finally filtered. From 100 parts of the best prim-wax 60 to 70 parts of ceresine are obtained. In appearance it closely resembles bleached beeswax; if it is desired to be of a yellow cast it must be colored. The production of ozokerite in Galicia amounted in 1875 to 44 million lbs., of which Boryslaw alone yielded nine-tenths.—*Chemiker Zeitung.*

MALACHITE GREEN.

By O. DOEBNER.

To two molecules of dimethylaniline mixed with about half of its weight of chloride of zinc is gradually added, at a gentle heat, one molecule of benzotrichloride. After the reaction is over the deep-green mass is freed from foreign matter by treatment with watery vapor.

The coloring matter thus formed dissolves in water, especially hot, but more readily in alcohol, with a deep-green color, and possesses all the properties of a good dye. By treatment with soda lye, and shaking with ether, the base of the color may be obtained in a free state. On evaporation of the ethereal solution it is left as a reddish-brown oil, which evaporates slowly, and shows no disposition to crystallize. It is readily soluble in ether and alcohol; its salts dissolve in water with difficulty, but readily, and with a green color in alcohol. On the addition of an excess of concentrated mineral acid the green color passes into a yellow, but is restored on the addition of much water. The green solution is completely decolorized by heating with zinc and muriatic acid, but the green color is restored by exposure to the air, and more readily by oxidizing agents.

MENDING PLATINUM CRUCIBLES, ETC.

MR. THOMAS GARSIDE says: Some months ago I had a platinum dish, which had a small hole on the side near the bottom, and the dish was consequently useless for most purposes. I was about to consign it to the old platinum, when it struck me that this metal being "weldable," I might manage to repair it. Having already a mould for this dish, made of plaster of Paris, and not of wood, this served admirably as an anvil. I then cut a piece of moderately thin platinum foil, about 3 m.m. diameter, and rubbed this and the part of the dish where the hole was with sea-sand until perfectly bright and clean. Having fixed the dish and its mould in an upright position, I laid the platinum foil over the hole, and directed the flame from a table blow-pipe upon the spot. A pair of scissors served as a hammer, and by gently tapping with these the two pieces of platinum united perfectly, and made so neat a joint that one would scarcely observe it unless one's attention was called to it. I have used the dish for all kinds of purposes since, but the union is as good as ever. In the above operation the plaster of Paris mould, although very dry, was split and cracked by the heat in all directions, nevertheless it had sufficient cohesion to last until the operation was concluded. I find that platinum wires are very easily joined in this way.

POISONOUS GLOVES.

BRONZE-GREEN gloves are fashionable in England, and the *London Times* recites the experience of a girl of seventeen whose hands were so severely poisoned by the arsenic in the dye that for three weeks she was compelled to carry them in a sling, suffering acute pain and being unable either to feed or dress herself, and at the end of that period they were still swollen to double their natural size.

ALIZARINE COLORS.

By H. W. VOGEL.

ALIZARINE blue dissolves with an indigo blue color in water to which ammonia has been added. If supersaturated with nitric acid the solution turns a brick red. Amylic alcohol quickly extracts the coloring matter from an acid solution, but from an alkaline solution with difficulty. Alcohol dissolves the coloring matter in a perfectly neutral condition with a violet color. If mixed with ammonia the solution turns blue like a solution of bluestone. For the detection of this dye ware it is advisable to heat the dyed goods with dilute muriatic acid, to extract the coloring matter from this acid solution with amylic alcohol, when it may be examined with the spectroscope or submitted to chemical tests.

Alizarine orange (nitralizarine) in an alcoholic solution is colored reddish by ammonia, pale yellow by nitric acid, and a beautiful rose color by caustic potash. From dyed goods it is extracted exactly like alizarine.

Malachite green closely resembles aldehyde green in its optical behavior, but differs in its chemical characters. It is much more easily soluble in alcohol, and the solution has more of a blue cast than that of aldehyde green. Malachite green is almost instantaneously discharged by ammonia, while aldehyde green turns gradually blue.—*Berichte der Deutsch. Chem. Gesell.*

THE SYNTHESIS OF INDIGOTINE.

At last the goal, to which such a number of the most eminent chemists have been tending, has been reached; the coloring matter of indigo has been artificially prepared from a derivative of benzene, and henceforth we may count it among the coal tar colors. We shall certainly see later on that this can only be said in a scientific sense, and that, in all human probability, the Bengal ryots will continue to supply indigo to the European market, little disturbed by the European gas works in their chances of earning a living; but for all that it cannot be gainsaid that science has celebrated a new triumph, and that the second of the most important vegetable coloring matters no more defies the art of chemistry than the coloring matter of madder has done. As in the case of artificial alizarine, the discovery of the synthesis of indigotine is not the result of a happy accident, but the crowning of long-continued efforts, carried out on a strictly scientific basis. This recent discovery is so far even more meritorious than that of artificial alizarine, as the obstacles on the way were far more formidable. It has, however, come to pass as it ought to be; this discovery was reserved for the same chemist who for many years past has studied the chemistry of indigo in its purely scientific aspect more than any other man living, and who has been the first to open out the road for inquiry into the inner constitution of indigotine—the celebrated Prof. Baeyer, of Munich, the worthy successor of Liebig in the same place. Many years ago he had shown how indigotine can be traced to a substance containing no oxygen, to which he gave the name *indol*, and the formula C_8H_7N , and how by successive stages oxygen is added to this compound till isatine is reached, from which indigotine is derived by a reducing action again. But it was tantalizing that, although both isatine and indol could be obtained from indigotine, the reverse reaction defied all efforts. Baeyer some time ago had succeeded in artificially preparing indol, and he had also succeeded in converting isatine into indigotine, to be sure by a very complicated and awkward process; but the gap between indol and isatine seemed incapable of being filled up synthetically, although analytically, that is descending from isatine to indol, had long been accomplished. At last the missing link has been found, and at the same time Baeyer has discovered a much simpler way of passing from isatine to indigotine, so that it is now in the power of every chemist possessing the usual laboratory appliances to prepare indigo artificially for himself. Baeyer's communications are contained in the *Berichte der German Chemical Society* for 1878, pp. 582, 1228, and 1296. He starts from phenylacetic acid, a compound well known for some time, and easily prepared synthetically itself in four or five different ways. This acid, by being converted into a nitro-product, and again reduced, yields oxindol, C_8H_7NO , a compound intermediary between indol and isatine. Oxindol is converted into nitrosoindol, this again into amido-oxindol, and by oxidizing the latter isatine, $C_8H_7NO_2$, is obtained. Isatine, when treated with phosphorus pentachloride, and then with ammonium sulphide, at last yields indigotine. Even from this short summary it will be apparent that the synthesis of indigotine is an extremely roundabout process, and of however great scientific merit and interest, certainly not destined to become a commercial operation. Still, almost the same might have been said when Graebe and Liebermann found out the synthesis of alizarine, and yet the ingenuity of technical chemistry has already mastered this process to such an extent that the yield of alizarine from the original raw material, anthracene, is almost 90 per cent. of that which can be computed from the formula; how far in other respects the battle has gone against the natural product from madder is well known to all your readers. But it is the opinion of this writer, which (as he can fully confirm from personal intercourse) is entirely shared by one of the discoverers of artificial alizarine, that the two cases were altogether different. In madder we had a material costing (before the competition of artificial alizarine) about 25s. per cwt., but containing hardly one per cent. of coloring matter, which accordingly actually cost about 25s. per pound. Moreover, the coloring matter in madder is so much mixed up with foreign matters that it necessitated the complicated and risky operation of dyeing in the beck, even in printing, and the beauty of the color was also seriously impaired by these impurities. No wonder that artificial alizarine, which is now obtained in a state of almost perfect purity, with any desired admixture of iso and flavopurpurine, fit for steam printing, and at a price of about 10s. per pound of real coloring matter, has almost killed the cultivation of madder, and deals a serious blow to the countries depending upon the latter. No such thing can happen with indigo. Here we have a material costing from 3s. to 5s. per pound, but containing up to 70 per cent. of real indigotine, that is to say, a state of purity which will not easily be surpassed by any artificial product. There is, consequently, really no margin upon which any artificial production of indigo might base its hopes of competition, and, as we have said before, in all human probability artificial indigo will remain a scientific curiosity of the highest order, but nothing beyond.

[We have received the above communication from a most highly valued correspondent in Switzerland, who kindly promises us further communications on the most recent improvements in the manufacture of artificial colors.—*Chemical Review.*]