The Art of Dyeing—No. 10.

GERMAN VAT—In our last we gave Dumas' method of setting and working the pastel vat, which is simply a variety of woad. The following is Dumas' account of the German vat :—

"This vat is of nearly similar dimensions to that used for woad. Its diameter is about 6½ feet, and its depth 8½ feet. Having filled the copper vat with water, we are to heat it to 200° Fah.; we then add 20 common pailsful of bran, 22 lbs. of carbonate of soda, 11 lbs. of indigo, and 5½ pounds of lime, thoroughly slaked, in powder. The mixture is to be well stirred, and then set aside for two hours; the workman should continually watch the progress of the fermentation, moderating it more or less by means of lime or carbonate of soda, so as to render the vat in a working state at the end of twelve, fifteen, or, at the most, eighteen hours. The odor is the only criterion by which the workman is enabled to judge of the good state of the vat, he must therefore possess considerable tact and experience.

In the process of dipping we introduce 84 lbs., 106 lbs., or even 130 lbs. of wool, in a net bag, similar to that in the woad vat, taking care that the bag is not allowed to rest against the sides of the copper. When the wool has sufficiently imbibed the color, we remove the bag containing it, and allow it to drain for a short time over the vessel. We operate in this way on two or three quantities in succession; we then remove the vat, and set it aside for two hours; we must be careful, from time to time, to replace the indigo absorbed by the wool, as also to add fresh quantities of bran, lime, and crystallized carbonate of soda, so as constantly to maintain the fermentation at a suitable point.

The German vat differs from the potash vat by the fact that the potash is replaced by crystallized carbonate of soda and caustic lime, which latter substance also gives to the carbonate of soda a caustic character. It presents a remarkable saving as compared to the potash vat; hence the frequency of its employment; but it requires great care, and is more difficult to manage. It also offers considerable economy of labor; one man is amply sufficient for each vat.

GERMAN WOAD VAT—The army cloth is usually dyed by means of the pastel vat, which gives the most advantageous results. We here make use of vats about 8½ feet in depth, and 5 feet in diameter, into which we introduce from 361 lbs. to 405 lbs. of pastel or of woad, after previous maceration. The vat is to be filled with boiling water, and we then add to the bath 22 lbs. of madder, 17½ lbs. of weld, and 13 lbs. of bran. The mixture is to be maintained in a state of ebullition for about half an hour; we next add a few pailsful of cold water, taking care, however, not to lower the temperature beyond 130° Fah.; during the whole of this time a workman, provided with a rake, keeps incessantly stirring the materials of the bath. The vat is then accurately closed by means of a wooden lid, and surrounded by blankets, so as to keep up the heat. It is now kept quiet for six hours; after this time it is again stirred by means of a rake, for the space of half an hour; and this operation should be repeated every three hours until the surface of the bath becomes marked with blue veins; we then add from six to eight pounds of slaked lime.

The color of the vat now boarders on a blackish-blue. We immediately add the indigo in quantity proportioned to the shade which we wish to obtain. The pastel in the foregoing mixture may last for several months; but we must renew the indigo in proportion as it becomes exhausted, at the same time adding both bran and madder. In general we employ 11 to 13 lbs. of good indigo for 100 lbs. of fine wool; 9 to 11 lbs. of good indigo for 100 lbs. of common wool; 9 to 11 lbs. of good indigo for 131 yards of cloth dyed in the piece."

Great care is necessary in the working of these vats, as indigo is dear; a careless blue-dyer will soon entail serious loss to his employers. The wool should be carefully examined before being dipped.

New Orleans Academy of Sciences.

The city of New York, which is the first in wealth and population on our continent, is behind Boston, Philadelphia, New Orleans, and young San Francisco, with respect to scientific associations. In all of the cities named there are Academies of the Sciences —associations of scientific men, who meet from time to time, and discuss questions of science. In New York there are a great number of scientific gentlemen, and it is a wonder to us that they have not organized themselves long ago into an association for presenting papers on science, and discussing such questions. We have no doubt but a very strong and excellent institution of this kind might be maintained in New York.

We have now before us the printed proceedings of the New Orleans Academy of Sciences, for which we are obliged to R. C. Kerr, in which we find much that is interesting. The following article is by Dr. Crawcour, we select from among quite a number.

ALLOTROPIC PHOSPHORUS—That various bodies possess the power of existing in two distinct forms, has long been an interesting fact in chemistry; and, in many instances, advantage has been taken of this alteration of form, inasmuch as we find that it frequently coexists with a sensible alteration of properties. If the expression may be allowed, the substance is the same, and yet different; different in this particular, that while the characteristic properties are unaltered, its solubility, in certain instances, its inflammability and action with certain re-agents are modified.

This property of bodies to exist in different forms, is termed *allotropism*, if the substances are non-crystalline; *dimorphism*, if crystalline. As examples of *allotropism*, we may mention vermillion, which, if heated, and then suddenly thrown into cold water, becomes black; if allowed to cool slowly, it retains its original color. Of *dimorphism*, the biniodide of mercury affords an apt illustration. When newly sublimed, it is of a yellow color, but changes to a bright scarlet on cooling; and it may be made to undergo this change by rubbing with the fingers, by which means the crystals are broken down and altered in form. The chromate of lead, which is usually yellow, becomes red if fused and thrown into cold water. A still more curious instance, and one which all must have observed, is afforded by arsenious acid, which, when newly sublimed, is a yellowish and transparent glass; left to itself it becomes opake and white; it is no longer vitreous, but is changed into a multitude of little crystals, and, at the same time, its density and solubility are altered. Rose, who has observed this change, states that where vitreous arsenious acid is dissolved in dilute and boiling hydrochloric acid, the solution, in cooling, deposits crystals of the opake acid, and a flash of light is emitted in the formation of each crystal. By exposing bodies to a high temperature, a still greater change is produced. Several metallic oxyds, as alumina and binoxyd of tin, often cease to be soluble in acid after being heated to redness. Berzelius states that when such bodies are exposed to a very high temperature, they suddenly glow, and become luminous; rising in temperature above that of the containing vessel from a discharge of heat. Dr. Graham believes that this change of property in bodies, results from loss of heat; that in this state they do not contain that quantity of heat, which they must have contained before, in a combined or latent form. No ponderable constituent is lost, but there is loss of heat. A change of arrangement of particles, it is true, occur at the same time, in some of these bodies, but this explanation will not apply to such bodies as alumina and binoxyd of tin. The loss of heat observed, will afford all the explanation necessary; if heat be admitted as a constituent of bodies equally essential as their ponderable elements. As the oxyd of chromium possesses more combined heat in the soluble, than in the insoluble state, the soluble may justly be viewed as the higher caloride; and the body in question may have different proportions of this, as of other constituents.

The phenomena under consideration, seem to require the admission of heat as a true constituent, which can modify the properties of bodies very considerably; otherwise a great physical law must be abandoned. No change of properties can occur without change of composition. But, if heat be once admitted as a chemical constituent of bodies, then a solution of the present difficulties may be looked for, nothing being more certain than that change in composition will account for change in properties.

The above remarks will apply very strongly to the body under consideration. In the ordinary state in which we see it, phosphorus is a soft, semi-transparent solid; highly inflammable; soluble in fixed and volatile oils, in ether, bisulphide of carbon, &c. In the new or allotropic modification, we have a red powder, insoluble in any of the above mixtures, requiring a high temperature for its ignition, and yet capable of being reconverted without any change of essential properties, (that is without losing or gaining anything,) into the common phosphorus of commerce.

The mode in which I have prepared it, differs somewhat from that recommended by Schrötter. The phosphorus, in small pieces, is thoroughly dried, and then placed in a small earthen jar, which is inverted into a larger one. The interspace is filled with white and very dry sand; the jars are then placed in a sand bath, and the sand heaped over them, and exposed to a steady and powerful heat for an hour. At the end of that time the phosphorus is seen diffused through the sand, in the form of a red powder. It is allowed to cool; the sand and phosphorus are separated by decantation; the phosphorus is treated with dilute potash, filtered, washed with water, then with dilute nitric acid, and then again with pure water, and allowed to settle. The result is a brownish-red powder, without luster, amorphous, insoluble in bisulphide of carbon, alcohol, ether, naphtha, and perchloride of phosphorus. In the air it is unchanged. It is not luminous in the dark at ordinary temperatures, but becomes so when near the point of ignition. No metallic salt is precipitated from its solution.

I attach some importance to this modification of phosphorus, as I hold it to be of the greatest service to medicine. It is well known that one of the working constituents of the brain and nervous tissues, is phosphorus. This is demonstrated not only by chemical analysis, but by the large amount of phosphates in the urine, after protracted or excessive mental exercise, and in those diseases called nervous; and Dr. Reese has demonstrated the existence of a phosphorised oil or fat in the blood.

It seems to me, therefore, that the most natural medication, in many such diseases, would be to return to the system, an element in which it is manifestly deficient; and this element is phosphorus. The objection to its use has hitherto been the great difficulty attending its exhibition. Its inflammability renders it impossible to form it into a pill, and its solution in oil is highly nauseous, while that in ether is not only nauseous, but dangerous. The allotropic phosphorus, while containing all the essential properties of the ordinary kind, is free from all these objections, and can be given in a pill as safely as the simpler articles of the materia medica. The German writers recommend it in the manufacture of lucifer matches and percussion caps. Its deficient inflammability would be an objection, I imagine, to its use. The density of common phosphorus is 1·77; it dilates and inflames below 140° Fah. The density of allotropic phosphorus is 1·964; it inflames at 492° Fah. Re-action from combustion of common phosphorus, highly acid, that from the other, very slightly so.

Improvement in Lathes.

The patent granted in this week's list to Wm. Stephens, of Richmond, Ind., for an improvement in lathes, by which the common lathe, without a slide-rest, can be converted into a slide lathe, by constructing and arranging the puppet-head to become a slide-rest. The puppet-head has its lower part fitted to an arc of a sector frame, which has its socket screwed to the bed of the lathe. The puppet-head can be secured at any desired point of the arc, so as to be thrown back and converted into a slide-rest, while for ordinary turning it is set and used in the common way. It is a neat and convenient improvement.

Feeding Flour Bolts.

The nature of the improvement of feeding flour bolts, for which Samuel Taggart, of Indianapolis, Ind., has obtained a patent, embraces the result of feeding the meal at all times uniformly to the bolts. The usual method of feeding the meal to bolts in making flour, is by spouts, having a drop shoe under each. These drop shoes receive a shaking motion by cams, or wiper wheels, and the meal slides down their inclined bottoms, and is conducted to the bolts, often irregularly, by ordinary spouts. By the new plan, the "hopper-boy," which receives the meal for the bolts, is fitted within an annular chamber, through which passes a vertical shaft, having arms upon it, with sweepers secured to their ends. Directly above the "hopper boy," on the vertical shaft, an arm having oblique flights upon it, is placed loosely and is connected by cords to a rod passing horizontally through the central shaft. Spouts lead from the lower end of the annular chamber to the elevated ends of the bolts. The central vertical shaft passing through the center of the "hopper-boy," rotates and gives motion to the flight arm named, which also rotates and carries the meal towards the center of the "hopper-boy," from whence it falls into the annular chamber and is cooled, while the sweepers take and force it into spouts, which convey it to the bolts, and thus feed it in more regularly than by the shaking of the shoes.

Castor Oil Electuary.

Many persons' stomachs revolt at taking castor oil in an undisguised form. To overcome this repugnance, it has been the practice to administer it in the shape of an emulsion, which involves a large increase in bulk of the dose to be taken, as well as the employment of a considerable quantity of gum, or the yolk of an egg, to form the emulsion. To disguise the castor oil, to give it a condensed form, and to diminish, as much as possible, the quantity of the excipient, the following formula has been devised :—

Take of castor oil, 3 ounces; white soft soap, 1 drachm; simple syrup, 1 drachm; oil of cinnamon, 6 drops.

Rub the soap with the simple syrup in a mortar, and then add gradually the castor oil, with constant trituration, until it is thoroughly incorporated with the above ingredients. Finally, mix with the electuary thus formed, the oil of cinnamon, or any other essential oil that may be preferred. By these means, a gelatinous electuary will be formed, which is rather palatable than otherwise, and nearly equals, bulk for bulk, castor oil in strength. The quantity of potash present in a dose of this electuary is only a homœopathic dose, and, consequently, not likely to produce a bad result in any case, even when its use should be contra-indicated.

Stuncke states that castor oil saponifies readily with alkalies, and gives with soda a solid white soap, which, in the form of pills, is a certain and agreeable purgative.

SEPTIMUS PIESSE.

London.

Heliographic Pictures

Our thanks are due to Niepce de St. Victor, for a fine heliographic likeness of the Emperor Napoleon III., forwarded to us through the kindness of Messrs. Gardissal, Paris. This new art of rendering plates capable of printing by employing the sun for the engraver, is but in its infancy, and is destined to effect a great revolution in ornemental printing. M. St. Victor is the nephew of the famous discoverer of the daguerreotype, and is a man of eminent attainments in chemistry, and the photogaaphic arts.