

LVIII. *On the Means of dying Linen and Cotton a beautiful, deep, and lasting black Colour. By Mr. VOGLER, of Weilburg.*

From CRELL'S CHEMICAL ANNALS.

THAT the art of giving to linen and cotton a deep and lasting black colour is attended with considerable difficulty, I am convinced, not only from the accounts I have received from manufacturers and dyers of eminence in their profession, but also from the experiments I have myself made on the subject. At last, however, after long and frequent trials, I have discovered a method, which, being many times repeated, was found to answer every time. The following is an exact description of it.

§ 1. Take a quart (thirty-two ounces) of very pure soft water, (for instance, rain or snow water, collected in the months of February or March,) and

and mix with it (in a very large bottle) two ounces, or two ounces and a half, of common aquafortis; then throw in gradually, two ounces, or two ounces and a half, (or even more if the aquafortis be pretty strong,) of litharge. The bottle, after being slightly corked, must be set in a warm place, and shaken from time to time.

After a few days, the clear liquor may be poured off from the sediment, into a deep earthen, leaden, or pewter vessel. In this clear solution of litharge in nitrous acid, the cotton or linen intended to be dyed (which should be well washed, but need not be bleached) is to be immersed, and is to macerate or soak therein for the space of ten or twelve hours. It may then be taken out, and, after being three times washed in pure cold water, (wringing it each time,) it is to be dipped in a solution (not too weak a one) of glue in water. Being then again wrung, it must, while yet wet, be put to dry in the shade; taking care that the glue-water is only wrung out, not washed out.

Raw, unbleached, and loosely-spun linen or cotton yarn, that has already been steeped in
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warm ley, and afterwards well washed in cold water, is more proper for the present purpose, and takes the application of the mordant, and that of the colour, more readily than the same materials after they are knit or woven.

Each skain is to be tied with two very loose and broad frings, of tape or binding; by the help of which, the skains, if they should happen to be entangled, during their maceration, or dying, may be separated, and brought into order again.

The glue-water, in which the linen or cotton (after it has been steeped in the solution of litharge) is to be dipped, may be prepared by reducing common carpenter's glue into a jelly or size, by boiling it in a pan with a small quantity of water, and then dissolving, in boiling water, such a proportion of the jelly as will give to the water a sticky or glutinous consistence, (when tried between the fingers,) leaving it, at the same time, sufficiently thin and fluid. The use of this glue-water, as I have observed on a former occasion, produces a more deep and lasting colour in the stuff to be dyed.

§ 2. Take three quarters of an ounce of galls, well bruised, boil them in a full quart, or rather more, of pure water, (rain or river water, for instance.) When they have boiled for the space of seven or eight minutes, throw in three quarters of an ounce of common salt; and, when that is dissolved, put in the linen or cotton stuff that is to be dyed, and that has already been soaked in the solution of litharge in aquafortis, and dipped in the glue-water, (§ 1.) When the stuff has been boiled in the liquor seven or eight minutes, it may be taken out; it is then to be three times washed and wrung, as before, in clean cold water, and afterwards dried in a shady place.

The linen or cotton stuff, which before was white, will be found to have acquired, from the foregoing operations, a dark grey colour, with a shade of yellow; this may be considered as a good ground for a black colour.

I have already shewn (in a former paper) that various solutions of lead, or of its calx, will render stuffs, prepared therewith, capable of acquiring (when boiled with the colouring-matter, of whatever nature, with which they are to be dyed)

a very full and rich colour, and one which penetrates very deeply into the substance of the stuff; but that the colour is dark and dingy, and therefore this mode of preparation may be more advantageously practised in dying brown and black colours than others.

In the place of galls, oak-bark, in powder, may be used; also the thin rind of the alder tree, the rind of the root of the walnut tree, the flowers or the shells of Pomegranates, Sumach, (*Rhus coriaria*,) the leaves of Tormentil-cinquefoil, (*Potentilla argentea*,) and Tormentil roots; all of which may be used in the same proportion as the galls.

Common salt also possesses the power of rendering the colour more deep and permanent; but it should be added when the boiling of the stuffs in the decoction of galls is nearly finished, as it might otherwise impede the extraction of the colouring-matter from the galls, or render the penetration of the said matter into the substance of the stuffs less strong.

§ 3. Take three quarters of an ounce of common copperas or vitriol of iron, and the same quantity

quantity of common falt, and diffolve them in a quart (thirty-two ounces) of clean hot water. Let the ftuffs, prepared in the manner before described, (§. 2.) with galls, or other astringent vegetable fubftances, and which have already acquired a blackifh colour, be immerfed in this liquor. After eight or ten hours, they may be taken out; wafhed and wrung three or four times in clean cold water, and then dried in the fhade.

The advantage arifing from the mixture of common falt, in this folution of copperas, is not only that lefs of the ground-colour (with which the ftuff is already prepared) is taken away, but alfo, the tints which are afterwards to be given to the ftuff, enter them more deeply, and produce a better colour. Of this I am convinced, by fome experiments I formerly made.

§ 4. Boil three quarters of an ounce of campeachy or logwood, in rather more than two quarts (thirty-four or thirty-five ounces) of rain or river water. When it has boiled feven or eight minutes, add to the decoction a quarter of an ounce of white ftarch; which, that it may not

be clotted or lumpy, must be first well mixed in a tea-cup with a little fresh water. When this, by boiling a few minutes, is dissolved in the liquor, the linen or cotton stuff (already prepared by means of the solution of copperas, &c. § 3.) is to be put into the liquor. After it has boiled therein for seven or eight minutes, it may be taken out; and, being first washed and wrung two or three times in clean cold water, as before, may be dried in the shade.

If, when the stuff is dry, its colour appears to be too faint, that is, if it should not be of a deep and fine black colour, (which however will not be the case, unless the process is improperly managed,) it must be again soaked in the solution of copperas, (§ 3.) and then boiled once more in the decoction of logwood. It cannot then fail to be of the wished-for black colour: but this colour is not yet so fixed as to bear being washed in ley, or even in soap and water. In order to bring the colour to this degree of perfection, the dyed stuff must, in the last place, be treated in the following manner.

§ 5. One ounce of galls, well bruised, or the same quantity of any of the astringent vegetable substances above mentioned, (§ 2.) and a full quart, or rather more, of glue-water, (of such a consistence as to feel clammy between the fingers,) are to be put over the fire: when the mixture has boiled seven or eight minutes, one ounce of copperas or vitriol of iron is to be added, and, when it is dissolved, the liquor may be taken off the fire. In this decoction, as soon as it is cold, the linen or cotton, prepared in the manner already described, (§ 1, 2, 3, 4,) is to be immersed. After remaining therein for the space of an hour, it may be taken out; and, having first been pressed or wrung, but not washed, may be hung up to dry in the shade. Here it may be left quiet for some time, (as is usual with respect to printed cottons and chintzes,) in order that the dye may incorporate with the stuff, and become fixed therein.

The decoction of logwood (§ 4.) may be kept for several weeks after it is made, even until it has acquired a bad smell; as it does not thereby

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lose, in the smallest degree, its colouring property, but, on the contrary, becomes more fit for use.

The addition of white starch to the decoction of logwood, promotes, in a remarkable manner, the solution and extraction of the colouring particles of that wood: it also assists in giving to the linen or cotton a deeper and more beautiful colour.

For boiling the ingredients, and macerating the stuffs, vessels of earth, of brass, or of copper, may be made use of: they should not be too wide, but the deeper they are the better, as, in such, the stuffs to be dyed may be more conveniently immersed, without being liable to rise up to the surface of the liquor.