

of its discovery; I will now tell you how it is made.

First of all aniline and sulphuric acid, in proper proportions for the formation of sulphate of aniline, are mixed in a large vat with water, and boiled until perfectly dissolved. Bicromate of potassium is then dissolved in a second large vat. These two solutions, when cold, are mixed in a third and still larger vessel, and allowed to stand one or two days. In this way a large quantity of a fine black precipitate is formed; this is collected upon shallow filters, well washed with water, and then dried. When dry it is a most unpromising sooty-black powder, and contains various products besides the mauve; the most troublesome of these is a brown, resinous product, soluble in most of the solvents of the coloring matter itself.

At first this resinous substance was removed by digestion with coal-tar naphtha previously to the extraction of the coloring matter, which was afterward effected with methylated spirits of wine, and the solution thus obtained when distilled left the mauve a fusible bronze-colored mass.

When digesting the black precipitate with naphtha or strong spirits of wine, the operation had to be performed in closed vessels under pressure or in connection with a condensing arrangement, otherwise large quantities of these valuable solvents would have been lost and great difficulty was experienced in getting apparatus perfectly tight, on account of the "searching" character of these fluids. Substitutes had also to be found for the ordinary materials employed by engineers for making good man-hole joints, and a number of other matters which are apparently of but small importance, but it is remarkable the amount of difficulty and annoyance they caused. The method of extraction has, however, been materially improved upon by substituting dilute methylated spirits of wine for strong, as this weaker spirit dissolves only a small quantity of resinous matter but all the coloring matter, so that the digestion with the coal-tar naphtha is now found unnecessary.

The solution of the coloring matter in dilute spirit is placed in a still and the spirit distilled off, the coloring matter remaining behind in aqueous solution; this precipitated with caustic soda. It is afterward collected on a filter, washed with water, and drained until of a thick pasty consistence, and, if necessary, dried.

The solid mauve dissolves very freely in spirits of wine, forming an intensely colored solution; it is also soluble to a small extent in water, but the aqueous solution on cooling forms a kind of jelly.

The formation of a mauve or aniline purple by the action of bichromate of potassium upon sulphate of aniline is a process of oxidation, and since the publication of the original specification at the Patent Office a great number of patents have been taken out for the preparation of this coloring matter, in which the bichromate has been replaced by other oxidizing agents, as peroxide of lead, permanganate of potassium, peroxide of manganese, chloride of lime, ferrocyanid of potassium, chloride of copper, etc.; but I need not make any special remarks upon these various processes, as experience has shown that bichromate of potassium and a salt of aniline, the reagents first proposed, possessed advantages over all others, and are

now nearly universally employed for the preparation of aniline purple. The next best process appears to be that of Dale and Caro, in which chloride of copper is employed.

The affinity of aniline purple for silk or wool is very remarkable; and, if I take some wool, and pass it through a solution of mauve, you will see how rapidly it absorbs it, even from a very dilute solution. Aniline purple is sent into the market in three different conditions—in paste, in solution, and in crystals; but the latter are very rarely employed, as they are very expensive, and do not offer corresponding advantages to the consumer.

The mauve is the most permanent coal-tar purple known especially in respect to its power of resisting the action of light.

I will now endeavor to give you some idea of the approximate amount of the various products, we have considered, obtainable from 100 lbs. of coal; and, for this purpose, I have arranged them in the following table, with their respective weights:—

	Lbs.	Ozs.
Coal.....	100	0
Coal-tar.....	10	12
Coal-tar naphtha.....	0	8½
Benzol.....	0	2½
Nitrobenzol.....	0	4½
Aniline.....	0	2½
Mauve.....	0	0½

You see the smallness of the amount of coloring matter obtainable from coal to coal-tar; but there is fortunately one thing which to some extent compensates for this, and that is the wonderful intensity of this coloring-matter. I will illustrate this remarkable fact. I have here a large carboy, containing 9 gallons of water, and will now add to this a solution containing 1 grain of mauve, and illuminate the liquid with the magnesium-lamp; and you see the single grain has colored this large bulk of water. A gallon of water contains 70,000 grains; therefore 9 gallons contain 630,000 grains. This solution, then contains only 1 part of mauve to 630,000 of water.

I have now shown you the manifold operations which have to be performed before we can derive the mauve from coal-tar, and have also mentioned a few of the obstacles which had to be overcome before its manufacture on the large scale could be accomplished. We have thus laid the ground-work of our subject; and in our next lecture, I hope to tell you a little more about mauve, and then give an account of the many other coloring-matters of which it may be considered the parent.

Purification of Chloral Hydrate.*

BY DR. F. A. FLUCKIGER.

There is perhaps scarcely a liquid in which chloral hydrate is insoluble at ordinary temperatures; four parts of it dissolve gradually in one part of water, the solution crystallizes at 0° C., but not in well-formed crystals. Alcohol and ether dissolve it to such an extent that it likewise does not crystallize well on evaporating these solvents; absolute alcohol must be excluded, because it combines with chloral.

*From Nues-Jahr. f. Pharm., in An. Jour. Pharm.

Chloroform and benzene are well adapted for recrystallization, but the first is too dear, and the last cannot be entirely removed from the crystals. The same holds good for oil of turpentine, from which beautiful tables and laminae are obtained, if 1 p. chloral hydrate is dissolved in from five to six parts of the oil at from 30 to 40° C., and the solution allowed to cool slowly. Fat oils, which dissolve it readily, are evidently not adapted for this purpose. From petroleum ether, which at a moderate heat dissolves much chloral hydrate, it crystallizes well on cooling, but too rapidly to admit of large prisms being obtained; on a large scale, however, it may be of better service.

Uniformly satisfactory results were obtained with bisulphide of carbon. 45 parts of it dissolve at 15 to 18° C., but 1 p. chloral hydrate; it precipitates ethereal and alcoholic solutions of the latter. But at temperatures below the boiling of bisulphide of carbon, 4 to 5 p. of it are sufficient for dissolving 1 p. chloral hydrate. If allowed to cool slowly, beautiful crystals often an inch in length are obtained, easily collected, and readily freed from the last traces of the solvent by exposing them in thin layers to the air. Thus obtained, chloral hydrate possesses no acid reaction and does not attract moisture. The best prisms begin to fuse at 49° C., larger quantities at 53 to 54° C., the fused mass congealing again at 34° or at 40° C. if a few crystals had remained unfused. Samples not well crystallized fuse at a lower temperature. The boiling point is 97.5° C. if the entire thermometer is surrounded by the vapors.

Bisulphide of carbon is cheap. Some loss is unavoidable; impurities in the mother-liquor increase gradually to such an extent that a rectification of the bisulphide over corrosive sublimate becomes necessary. With the last portions of the solvent a little chloral hydrate evaporates from the crystals, but the loss from the source is insignificant, ½ grm. having lost but 3.3 per cent. in nine days. A draft of cold air, the addition of some petroleum ether, and the employment of the centrifugal machine will be of service when operating on a large scale. The price of chloral hydrate ought not to be raised in consequence of such purification.

Chloralum—A New Antiseptic.*

BY PROF. JOHN GANGE.

The hydrated chloride of aluminum is a salt, which, as preservative of organic compounds, I have made the subject of numerous experiments for some months past, and the more I work with it the more am I surprised that it has not been used in medicine. That, in common with other aluminum salts, it has the power of arresting decomposition, may not be altogether unknown; and what I claim as the result of my researches is, the recognition of its extraordinary value as an antiseptic—indeed, as a substitute for the very poisonous solutions of chloride of zinc—the caustic carbolic acid, which, from its smell, cannot serve for many purposes; chloride of lime, which evolves the most unpleasant fumes when used in water closets or elsewhere; the permanganates, which stain; and sulphurous acid, which cannot be conveniently used in hospitals or in the sick chamber.

*From the Chemist and Druggist.