the solution quite limpid and miscible with water, without the production of turpidity. I conclude that *when a warm solution of citrate of iron exercises a prolonged action upon recently precipitated hydrated sesquioxide of iron, it has the property of dissolving a portion of the hydrated base.*

The preparation of scales of citrate of iron is not at all difficult, even if all the citric acid has not been saturated. But to prepare the

AMMONIA-CITRATE OF IRON.

successfully and handsomely, the complete saturation of the citric acid with hydrated sesquioxide is quite necessary. If this is not the case, the resulting salt is removed from the glass plates with more or less difficulty, and cannot be obtained in handsome scales, being generally of a muddy color. I have been in the habit of reserving about one-sixteenth of the solution of citrate of iron, adding to the main bulk of the solution aqua ammonia until in slight excess, and then the reserved portion. The salt obtained was invariably found to be rapidly soluble in water, and, while it is readily removed from the glass plates, to be less prone to deliquescence than the compound completely saturated with ammonia. The direction of the Pharmacopœia to use a given measure of aqua ammonia is objectionable, on account of the inconvenience resulting from the variable strength of that article as found in the shops or obtained from the manufacturer; and while it is a very simple matter for the skilled operator to determine the strength of aqua ammonia expeditiously, it requires more time than pharmacists not skilled or prepared for these determinations are willing to devote to it, and as a consequence, the preparation is purchased. But if by some simple change in the manipulation we can reach the same end and at the time avoid the possibility of failure by reason of inequality of the substance used and that intended to be used, we encourage the preparation of this salt, and by similar attention to other preparations encourage the home production of many that are now exclusively procured from the manufacturers. Simplicity in the construction of formulas, and explicit directions that will enable the unskilled operator to determine the nature of the numerous difficulties that rise in his path, will do more toward encouraging the home production of pharmaceutic preparations than the numerous lectures that are given through the pages of journals of pharmacy, while at the same time by the practice the unskilled become skilled.

CITRATE OF IRON AND QUINIA.

This compound of the Pharmacopœia I have found so excessively difficult of solubility, even when heat is applied to favor it, that it has been a question with me whether its medicinal efficacy is not impaired thereby. There exists no particular difficulty in preparing a handsome article when the directions of the Pharmacopœia are followed, but these directions are liable to the same objections as specified previously with regard to solutions of citrate of iron, as a good result is dependent entirely upon the accurate attention given the preparation during the process of heating; for if the heating reaches a certain point of temperature higher than directed when the quinia is being dissolved, it is apt to agglomerate into masses which are very unmanageable and difficult to dissolve. In my experience, the difficulty is obviated by triturating the properly precipitated and washed quinia, with a portion of the solution of citrate of iron, introducing it into a flask and then adding the remaining solution. By occasional agitation, the quinia dissolves in a short time, forming a clear solution, which may be concentrated on a water bath without paying any special attention to temperature, and will scale with perfect facility. But by far the more popular salt is the

AMMONIO-CITRATE OF IRON AND QUINIA,

which appears to have replaced the officinal compound almost entirely. This I have prepared almost succesfully by reserving about one-sixteenth of the solution of citrate of iron and quinia obtained as above, and adding to the remaining fifteen-sixteenths, contained in a flask, dilute aqua ammonia in fractional portions, until a permanent precipitate results. Upon each addition of ammonia, quinia is copiously precipitated, but dissolves readily by agitation until toward the end of the process, when it will dissolve more slowly, and care must be exercised to avoid an undesirable excess of alkali. The addition of the reserved one-sixteenth of solution will redissolve the precipitate formed, by careful manipulation; and the solution when evaporated to the consistence of treacle—which can in this instance also be done upon an ordinary water bath without special care as to temperature—will, when spread upon glass plates, form glass scales of a handsome garnet color, of perfect and rapid solubility, and only moderate deliquescence.

Some remarks on dispensing these results may not be out of place here, for I have on various occasions experienced annoyance which, by a little foreknowledge, might have been entirely obviated.

SOLUTIONS OF THE SOLUBLE CITRATES

The most expeditious method of dissolving the soluble scaled preparations consists, in my experience, in placing the salt in a mortar, adding just sufficient water to cover it, allowing it to stand a minute or so, and then gently triturating the mixture with a pestle, when perfect solution will result. If it is attempted to dissolve these salts by direct trituration with water, they will adhere to the pestle and sides of the mortar, and greatly delay the operation. Dispensers are in the habit of simply throwing the scale into the aqueous menstrum and promoting solution by stirring, and while this is sometimes as effectual as the method proposed, it frequently delays solution, and should therefore not be resorted to.

PILLS OF THE SOLUBLE CITRATES

are found by me to be most conveniently and expeditiously prepared by adding from ten to fifteen per cent. of finely-powdered elm bark, and forming a mass by the aid of glycerine, which appears to exercise just sufficient solvent power to effect proper cohesion. Plastic mass is obtained, which does not harden rapidly, and is readily rolled into pills.

The saffron of Pharmacy, which is prepared mainly in two or three of the provinces of France, is so light when dried that from 35,000 to 40,000 flowers are required to make a pound. Each plant produces only three flowers.

On the Aniline or Coal-Tar Colors.*

BY W. H. PERKIN, F.R.S.

Coal-Tar, Benzol, Nitrobenzol, Aniline, and Aniline Purple or Mauve.

In this short course of lectures, it is my desire to bring before you a somewhat condensed history of the artificial colouring matters, generally known as the "Coal-Tar Colors." By this designation it is not meant to imply that coloring matters actually exist in coal-tar, and may, therefore, be extracted from it, but that coal-tar is the source of certain products which, when changed by various chemical processes, are capable of yielding colored derivatives. You will thus perceive that it is important for us to consider the various means employed to obtain the raw materials before giving our attention to the coloring matters themselves. We will, therefore, at once proceed to the consideration of "coal-tar;" its formation and constitution.

Coal-tar consists of the oily fluid formed by the destructive distillation of coal, and is obtained as a secondary product in the manufacture of coal-gas. Originally, coal-tar was a great nuisance to the gas manufacturer, and it was often a problem to him what he should do with it. I need scarcely say that this state of things is now changed. In the gas works the coal is distilled in large retorts, sometimes 25 or 30 feet in length. They are made of fire-clay or iron, and several are arranged in one furnace or oven, as it is usually termed. Each retort is fitted with an iron mouth-piece, from which a vertical tube rises, the mouth-piece also having a door fastened with a cross-bar and screw.

When in use, these retorts are rapidly filled with coal by means of a proper scoop, and then the doors are luted and fixed so as to be air-tight. Distillation commences immediately, as the retorts are constantly kept red hot. The gas and other products which form pass up the front vertical pipe (connected with the mouth-piece), through a bend, and down into a long horizontal tube, called the "hydraulic main." Here most of the oily products condense, and as they accumulate pass on with the gas down the general main, and flow into a tank provided for their reception. These oily products constitute "coal-tar." The coal-gas, leaving this tar behind, passes on to the condensers, and deposits a second, but smaller quantity of tar, and is then purified and stored in the gas-holders. The gas, however, does not interest us now.

I am here distilling some coal in a small glass retort, the beak of which is inserted into one of the openings of a three-necked receiver. The second opening is connected with the tube, so that the gaseous products may be examined, while the third and lower one is fitted to a small bottle, in which you see we have already obtained a quantity of an oily fluid. This is our coal-tar.

Having now seen how coal-tar is produced, we will consider of what it consists. Coal-tar is by no means a definite body, but contains a great number of substances, as a glance at the following table will show:—

*The Cantor Lectures, delivered before the Society of Arts. Published in the Chemical News.