CHEMISTRY FOR PHOTOGRAPHERS

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CHAS. F. TOWNSEND

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BY

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CHEMISTRY FOR PHOTOGRAPHERS.

CHAPTER I.

INTRODUCTORY.

THE first essentials to anyone studying chemistry are accuracy and cleanliness. Most of the surprising results obtained by students in their early days are due to want of cleanliness. Another point I should like to impress upon those just taking up the subject is that learning "facts" in a more or less mechanical way is not learning chemistry. It is said that a good lawyer does not know much law, but knows where to find his law. The same applies to a good chemist. Above all, endeavour to get an insight into the nature of things, and remember that the proper place for a dictionary is not inside a man's head, but on a shelf. If particular sets of facts or figures are often required for reference, don't try to learn them, but cut or copy them out, give them a coat of varnish and paste them on the

The construction of a burette will readily be seen from the figure (fig. 1). The instrument can be purchased with a glass tap, or with a glass jet, a piece of india-rubber tubing and a pinchcock, the latter being quite as convenient and much cheaper. For photographic purposes, burettes for the different developing solutions should be suspended round the sink as shown in the sketch (fig. 2), being fed from stock bottles on a shelf above, when large quantities of material are used. It is well to have an opal glass plate at the back of the fixed burette, and to read the level of the bottom of the black curve at the top of the liquid when measuring. A float with a line engraved on it is sometimes used for reading, and has the advantage of keeping the solution from the air as well as or better than a stopper. The construction of a pipette will be seen from the last part of figure 1. It is filled by drawing up the liquid with the mouth: the finger is then placed rapidly on the top, and the liquid is allowed to run down to the mark. The pipette with its contents is then transferred bodily to the vessel into which it is required to run the liquid.

In the metric system, the centimetre is the measure of length, the cubic centimetre the measure of capacity, and the weight of 1 cubic centimetre of water at 15° C., or the gram, is the measure of weight. How delightfully simple these are, compared to the complicated and heterogeneous measures of the pharmacist! An inch is about $2\frac{1}{2}$ centimetres, and an ounce about 28 grams, a fluid ounce being 28 cubic centimetres. For larger measures the litre containing 1000 c.c., and the kilogramme or kilo. of 1000 grams, are used. For small measures the decimals of the gram and the centimetre are employed. Going up the scale, 10, 100, 1000, etc., grams and centimetres follow in order, and going down the scale, $\frac{1}{10}$, $\frac{1}{100}$, $\frac{1}{1000}$ of a gram or centimetre follow one another, the decimal system being employed throughout. It is convenient to remember that a litre is very nearly a pint and three-quarters. The following table gives the means of converting English into metric equivalents, and *vice versâ*.

TABLE I.—Weights and Measures in British and Metric Systems.

APOTHECARIES' WEIGHT (by which Formulæ are made up).

20 grains = 1 scruple	. . =	1·296 grams.
3 scruples = 1 drachm = 60 grains	=	3·887 ,,
8 drachms = 1 ounce = 480 ,,	=	31·1 ,,
12 ounces = 1 pound = 5760 ,,	=	373·2 ,,

AVOIRDUPOIS WEIGHT (by which Chemicals are sold).

437½ grains = 1 ounce	. . =	28·4 grams.
16 ounces = 1 pound = 7000 grains	=	453·59 ,,

METRIC SYSTEM—WEIGHT.

10 milligrams = 1 centigram	. . .	=	·1543 grain.
10 centigrams = 1 decigram	= 100 milligrams	=	1·543 ,,
10 decigrams = 1 gram	= 100 centigrams	=	15·432 ,,
10 grams = 1 decagram	. . .	=	154·323 ,,
10 decagrams = 1 hectogram	= 100 grams .	=	3 ozs. 227½ grains.
10 hectograms = 1 kilogram	= 1000 grams .	=	35 ozs. 87½ ,,