SOME NEW FORMS OF APPARATUS.

By Augustus E. Knorr.

Received August 23, 1897.

I. AN AUTOMATIC FILTERING SIPHON.

In order to avoid the constant attention required in filtering large bulks of liquids, the following device has been found useful and an improvement on Mariotte's bottle. In using the latter any sediment or precipitate will go into the filter first and greatly retard the operation. The siphon consists of a glass tube bent after the usual fashion, as shown in Fig 1, *a*, and it is adjustable by means of a wire support laid over the top of the beaker or vessel containing the solution to be filtered. The longer limb is slightly expanded at the end and a conical valve ground in; the valve has a ball blown on and a knob at the opposite end of the stem, which prevents it from falling out of the tube having a constriction to engage the knob (shown in Fig. 1, *b*). The glass bulb causes the valve to float on the liquid in the funnel, rising as it fills until the valve is pressed home, when the supply of liquid is interrupted, only to admit a fresh quantity when the level again falls. The wire support and manner of placing it on the beaker is shown in Fig. 1, *c*. It is made of two pieces of stout wire twisted about a piece of brass tubing one inch long and fastened with a drop of solder. A short piece of rubber tubing slipped over this allows the shorter limb of the siphon to be adjusted by sliding up or down. Large bulks of solutions can be filtered through small filters, which is often desirable when there is only a small precipitate, and the latter is left undisturbed until nearly the entire solution has been filtered. A suction-pump can be employed at the same time if desired.

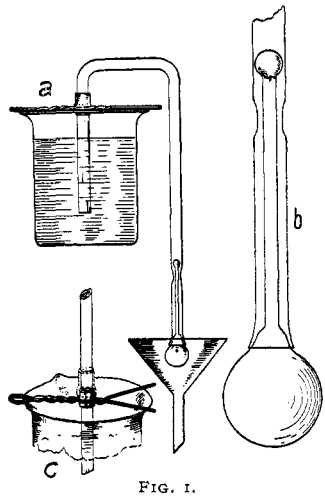

Fig. 1.

This device can be equally well employed in evaporating large quantities of water, and dishes down to the smallest size can be used, which is often an advantage, for instance, in water analysis ; when once put in operation it can be left over night with perfect safety.

The operation, filtration, or evaporation having been completed, the siphon is washed out by removing the tip from a wash-bottle and blowing a stream of water through the shorter limb.

2. A NEW FORM OF GAS GENERATOR.

The gas generator here described has been found a source of great comfort in metallurgical work, where as in the analysis of refined copper it is not an infrequent occurrence to precipitate fifty to 100 grams of metal at a time in the form of sulphide. Fig. 2 represents the apparatus in its simplest form. The iron sulphide is contained in a calcium chloride jar and is decomposed by allowing hydrochloric acid, diluted with its own bulk of water, to trickle over it drop by drop. The spent acid collects at the bottom, and reaching the level of the U-shaped siphon, it will run out as fast as supplied. It may be discharged directly into the sewer, or a large bottle may be placed under the overflow, to be emptied from time to time. The siphon tube is the novel and essential feature of the apparatus, allowing no spent acid to foul the iron sulphide, while at the same time forming a perfect hydraulic seal against any escape of gas. It must be made sufficiently long for the column of liquor contained in it to overcome the pressure of the liquor in any precipitating vessel of ordinary size. For the same reason the stem of the acid bulb must be at least six or eight inches long.

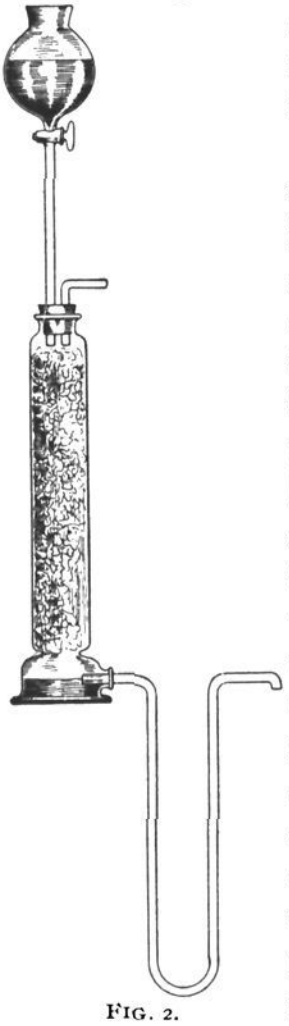

FIG. 2.

Fig. 3 shows a larger and somewhat more elaborate form of this generator made for the special purpose of supply-

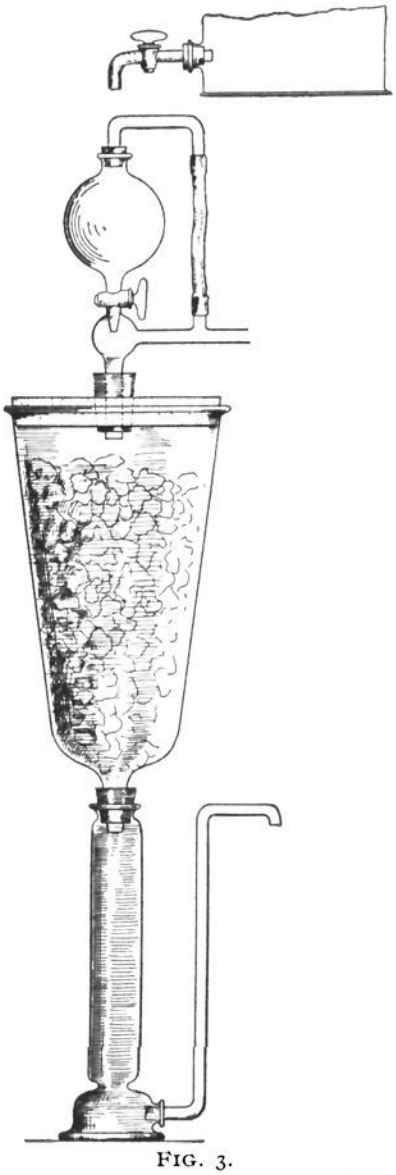

FIG. 3.

ing very large quantities of hydrogen sulphide, where the smaller apparatus would require refilling every day or two. A large druggist's percolator of heavy glass, holding twenty or thirty pounds of iron sulphide was fitted into a calcium chloride jar, acting as a support and at the same time forming one limb of the siphon. The other limb was made of glass tubing appropriately bent. In order to avoid an inconvenient length of the stem of the acid bulb, the top of the latter was made to communicate with the interior of the generator through a T in the delivery tube and proper rubber connections. This equalizes the pressure above and below the acid and allows it to fall by its own gravity. In an apparatus of this size the flow of acid does not immediately answer changes in the speed of acid supply. In order to regulate it, it was found convenient to observe the flow of acid through a small bulb blown on just below the stop-cock and containing a projecting nipple, because after a short time the glass of the generator becomes covered with a black coating through which it is impossible to observe the drops of acid. The top of the percolator was closed with a six-inch rubber stopper permanently sealed in, while the stem of the acid bulb passed through a second rubber stopper, one inch in diameter, fitted into the first. In filling the apparatus only the small stopper is removed, and it was found advisable to use only coarse pieces of sulphide, powder and finer particles having a tendency to wash down and choke the throat of the percolator in a short time. A large acid reservoir placed on a shelf above the acid bulb is a convenience but not a necessity. The whole apparatus was securely clamped against the outside of the hood,

only the delivery tube projecting into the same. This generator in daily and almost constant use has been found to work without refilling or other attention for three months at a time, and would perhaps be best appreciated in college laboratories and others requiring an abundant and reliable supply of hydrogen sulphide. It can also be advantageously employed for generating carbon dioxide, hydrogen, and other gases.

A STUDY OF THE MIXED HALIDES AND HALO-THIOCYANATES OF LEAD.

BY CHARLES H. HERTY AND T. R. BOGGS.

Received August 24, 1897.

IT has recently been shown[1] by one of us (Herty) that the so-called compound $Pb\langle^{I}_{Cl}$ is not a true chemical compound, but a mixture of lead chloride and lead iodide. More recently Herty and Smith[2] have confirmed McMurtry's[3] observation that the substance $Hg\langle^{Cl}_{CNS}$ is a true chemical compound, and not a mixture of mercuric chloride and mercuric thiocyanate. This suggested the question, Is the formation of mixed crystals in the one case and a true chemical compound in the other due to the character of the metal present or to the difference in the character of the negative radicals present in each case? To determine this a systematic investigation of the products formed by dissolving lead chloride and lead thiocyanate was undertaken. It has been found that $Pb\langle^{Cl}_{CNS}$ is a true chemical compound, just as in the case of $Hg\langle^{Cl}_{CNS}$. Plainly, the character of the metal present is not the determining factor. If then, the difference be due to the character of the negative radicals present, the so-called salt $Hg\langle^{I}_{Cl}$ should be a mixture and not a true chemical compound.

However, before beginning work on this point, it has been deemed advisable to make a thorough study of the compounds of lead with the halogens and with thiocyanogen, including all

[1] *Am. Chem. J.*, 18, 293.
[2] This Journal, 18, 906.
[3] *J. Chem. Soc.*, *1889*, 50.