fact it is possible, from a knowledge of the susceptibility of a binary mixture in which the components are known, to determine the concentration of each of the components. To accomplish this, it is only necessary to know the susceptibility of each of the components in the pure state and the susceptibility of the mixture. When the susceptibility of one of the components differs very considerably from that of the other the accuracy of the method is sufficient for many purposes.

COLUMBUS, OHIO.

NOTE.

A New Hydrogen Sulfide Generator.—Many types of apparatus have been designed and are sold for use as hydrogen sulfide generators. Of these, some are self-contained and portable, while others consist of various arrangements of bottles, stoppers, tubes, etc., and, like the water still and steam bath, are regarded as laboratory fixtures. In spite of the many designs of generators, the big problem of the instructor in qualitative analysis is still the hydrogen sulfide supply. The average small generator requires the instructor's constant attention, and is then generally failing to supply gas or is wasting it.

As a contribution toward the solution of this problem for chemical laboratories, the writer has designed the generator shown in the accompanying illustration, which is a quarter section, side elevation of a generator embodying the design.

The apparatus consists of an outside container, 5, which is closed at its upper end by a cover, 11, securely clamped at its edges by suitable clamps, 4. A gasket, 3, is interposed between the cover and the upper edge of container 5, to make a gas-tight connection.

Within container 5 is an intermediate container, 6, open at its upper end and communicating with the interior of container 5 at this point. The base of container 6 is provided with an annular flange, which serves to keep it in a central position within the outer container, and thereby form between the lateral walls of the containers an annular chamber for the reception of the iron sulfide.

Coöperating with containers 5 and 6 is the container 1, having an enlarged spherical upper end, and a reduced downwardly tapering lower end which passes centrally through a ground-glass joint in cover 11 and communicates with container 6 at its bottom.

The cover 11 is formed with a gas outlet, 15, into which is fitted a capillary tube of such size that gas from the generator is delivered through it in a slow, steady stream. Within a depression formed in the cover and surrounding the capillary tube is a quantity of water through which the gas must bubble as it passes from the apparatus. A glass stopper, 12,

stopcock, 13, and tube, 14, are provided for the delivery of the gas, and a drain-cock, 9, permits the removal of the spent acid.

When using the generator, the annular space between the lateral walls of containers 5 and 6 is first filled with lumps of iron sulfide. The cover is then clamped in position and the container 1 filled with properly diluted acid. The acid introduced into container 1 passes from its lower end into container 6, rising slowly in the latter until the pressure of the confined gas prevents further rise of the acid. When the stopcock 13 is opened gas escapes, thereby lowering the gas pressure in containers 5 and 6, which permits the acid to rise in container 6 until it overflows the upper edge thereof and trickles down upon the iron sulfide in container 5. When this is done, gas is immediately generated, and as the gas pressure rises the acid is forced down in container 6 and up into the globe of container 1. The gas thus generated is stored in container 6, until subsequently drawn out through the stopcock 13. When the stored gas is drawn upon, the pressure within the apparatus is again lowered, and the process just described is repeated. Thus it will be seen that the apparatus is automatic in operation, the amount of gas generated being controlled directly by the amount of gas withdrawn.

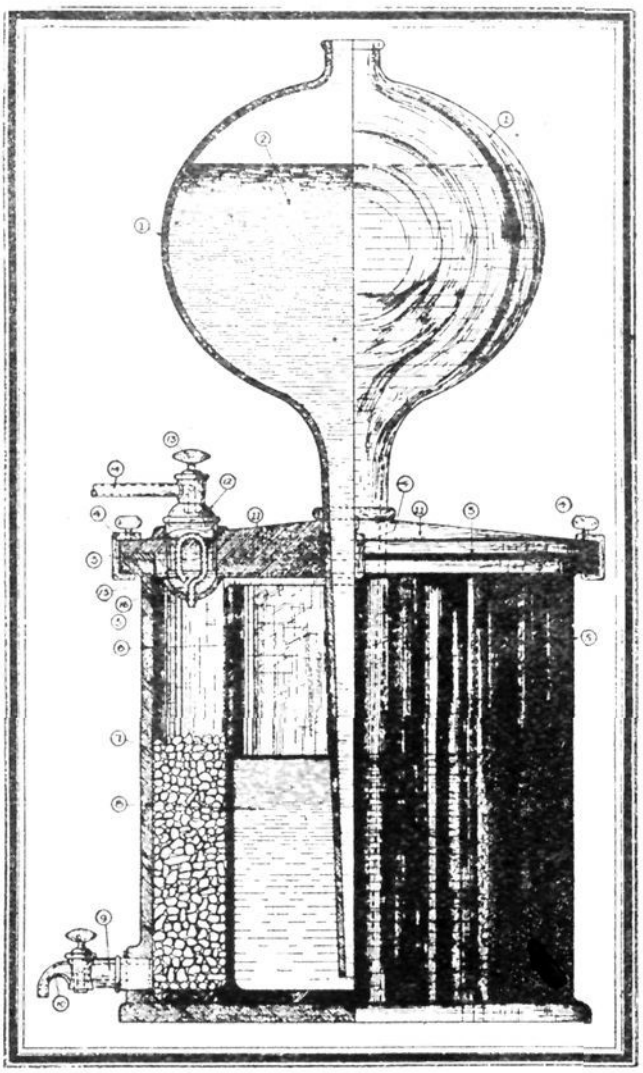

Fig. 1.

The advantages of this generator over existing types are as follows:

1. The apparatus has greater stability owing to the fact that the 3 containers are arranged concentrically in a horizontal plane instead of vertically, thereby giving it a wider base and materially reducing the height.

2. There is incorporated as an integral part of the generator a device for washing the gas as it passes out.

3. There are no rubber stoppers or tubes used in connection with this

generator, hence there can be no leakage of acid or gas as a result of deteriorated fittings.

4. The apparatus is controlled by causing the gas to pass through a small opening. As there are no small tubes through which the acid must pass, commercial acids containing solid impurities may be used, if desired.

5. The apparatus is more easily accessible than any other, hence is more easily cleaned, and may be charged with larger lumps of iron sulfide than is possible where access to the interior is through a small opening only.

6. The generator has a larger storage capacity for gas than any other self-contained apparatus, hence is less likely to overflow, owing to a lack of storage capacity, when the gas is shut off.

7. The generator operates on the principle of delivering small quantities of acid into the iron sulfide chamber, which is generally admitted to be the best.

T. R. ERNEST.

AMERICAN UNIVERSITY,
WASHINGTON, D. C.

[CONTRIBUTION FROM THE DIVISION OF LABORATORIES AND RESEARCH, NEW YORK STATE DEPARTMENT OF HEALTH.]

A NEW FORM OF ULTRA-FILTER: SOME OF ITS USES IN BIOLOGICAL AND SYNTHETIC ORGANIC CHEMISTRY.[1]

BY PHILIP ADOLPH KOBER.

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I. Introduction.

Ultra-filtration has hitherto meant filtering through semi-permeable membranes, which were used, until recently, for the separation of "crystalloids" from "colloids." To-day it has a broader meaning; signifying the separation, by filtration, of the relatively small molecules from those relatively large.

Through the work of Bechhold,[2] Walpole,[3] Brown[4] and others, a substantial start has been made in the development of selective filtration. These investigators describe membranes of almost any degree of permeability which were made by them. Bechhold and Walpole showed that dialysis could be used for ultra-filtration purposes, if it were not for the enormous dilution of both filtrate and residue caused by the dialyzing water. As some of the dialyzable constituents diffuse out of the membrane, the remainder becomes dilute, due to endosmosis, and the speed

[1] Read before the Biological Section, American Chemical Society, Boston, Mass., Sept. 11–13, 1917.

[2] *Z. physik. Chem.*, **60**, 259 1907).

[3] *Biochem. J.*, **9**, 285 (1915).

[4] *Ibid.*, **9**, 591 (1915); **11**, 40 (1917).