

into a 500 cc. measuring flask. Add about two-thirds of the amount of sal soda solution necessary to a complete neutralization. *If not cold, cool.* Add zinc oxide emulsion till solution stiffens, *avoiding an excess.* Dilute to about three-fourths of the capacity of the flask, mix and let stand till the ferric oxide begins to settle. See that the solution is colorless. *Add considerable excess of zinc oxide emulsion.* Mix. Dilute to mark. Insert stopper. Mix. Transfer to dry beaker. Mix again. Let settle, and pour off 250 cc. Titrate in 500 cc. Erlenmeyer flask, (first heating to boiling) with permanganate of strength 0.0056. Make the necessary deduction for impurities in the sal soda and zinc oxide. Divide the number of cubic centimeters permanganate taken by ten. *Deduct 0.02 per cent.*

Following are some comparisons of results by this method with results by Volhard's method, gravimetric method, and color method:

TABLE XI.

No.	Volhard with all precautions. Per cent.	Stone with all precautions. Per cent.	Gravimetric. Per cent.	Color. Per cent.
1451	0.51	0.51	0.52	0.53
452	0.44	0.42	0.43	0.435
453	0.46	{ 0.42 0.43	0.425
453	0.47	0.45	0.46	0.45
493	0.46	0.47	0.46
466	0.41	0.41	0.41	0.43
466	0.49	0.49	0.485	0.49
481	0.45	0.46	0.455	0.469
153	0.64	0.65	0.64

A SIMPLE FORM OF GAS REGULATOR.¹

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A GLASS tube, one end of which is blown out to a bulb is bent around twice, as indicated in Fig. 1, and is provided with a side tube *T*. Some mercury is poured into it, which cuts off a volume of air in bulb *A*. The smaller tube *I* fitting loosely in the wider tube, is connected with the latter by a piece of rubber tubing, which at the same time allows an up and down

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movement of the small tube. This apparatus is put into the air or water bath, which is to be kept at a constant temperature; its working is effected by the expansion by heat of the

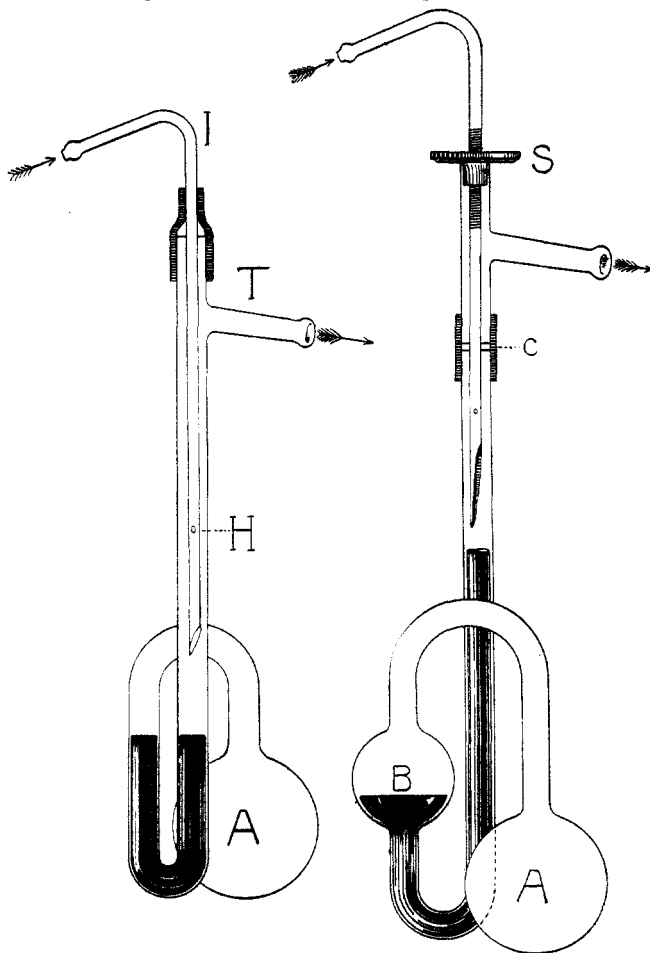


Fig. 1.

Fig. 2.

volume of air in bulb *A*, which causes the mercury column to rise until it reaches pipe *I*, serving as inlet of the gas. From the space over the mercury column, the gas is conducted through the pipe *T* to the burner. As the inlet pipe is cut off

obliquely or drawn out to a slit, the supply of gas is with increased temperature diminished by and by, and might even be cut off altogether if the pipe were not provided with a small hole *H*, which allows the passage of a sufficient amount of gas to prevent the extinction of the flame. The smaller supply of gas lowers the temperature, and the sinking of the column of mercury caused thereby allows then the gas to pass again freely. It is easy to keep the air- or water-bath, which is provided with this apparatus, constantly at any desired temperature within 1° to 2° F. by regulating the position of the inlet pipe. The daily changes in the atmospheric pressure have very slight influence.

As the amount of mercury might at higher temperature not be sufficient to keep back the expanded air a small bulb might be blown in the second bend (*B*, Fig. 2), and thereby a sufficient supply of mercury for even very high temperatures can be provided. If the apparatus is intended for a closed bath, the main pipe is cut at *C*, the lower part is then fixed from inside and connected outside with the upper part by means of rubber tube. The standpipe *l* may also be regulated by a screw movement *S*.

This apparatus has the advantage of being simple and cheap. It can be used for open or closed baths at either high or low temperatures. The main drawback of all other similar apparatus is the black mass caused by the action of illuminating gas on the mercury, which collects in a short while on the surface of the mercury column and stops the action completely. The apparatus described allows the removal of the dirty mercury and filling anew in the easiest and most rapid manner.

Furthermore, there is no stop-cock or rubber tube connection between the working parts, that is, the expanded volume of air and the column of mercury.