When resorcinol alone is treated as described above, a red solution is obtained with marked blue fluoresence. One decigram of phthalic acid with the resorcinol gives a light solution with very strong green fluorescence; one milligram, a red solution with green fluorescence; and one-fifth milligram, a solution redder than the last, with blue-green fluorescence; on comparing it with the solution obtained from resorcinol alone, the green hue of the fluorescence is distinctly recognizable.

The following substances were also tested, one decigram being used in each case: naphthalene, red-pink solution, with green fluorescence; $\alpha$-naphthoquinone, the same; $\beta$-naphthoquinone, dark green solution, no fluorescence; $\alpha$-naphthol, red solution, blue fluorescence; $\beta$-naphthol, the same. In none of these cases was the fluorescence as marked as when one-fifth milligram of phthalic acid was employed. Phthalonic acid gave a dark red solution, with strong blue-green fluorescence; phthalid-carbonic acid, a pink-red solution with green fluorescence, much resembling that obtained from naphthalene; and homophthalic acid, a slightly red solution, with green fluorescence, almost as strong as when a decigram of phthalic acid was used.

I desire to express my thanks to Prof. W. Lash Miller under whose direction this work was performed.

UNIVERSITY OF TORONTO,
Toronto, Canada.

---

## NOTES.

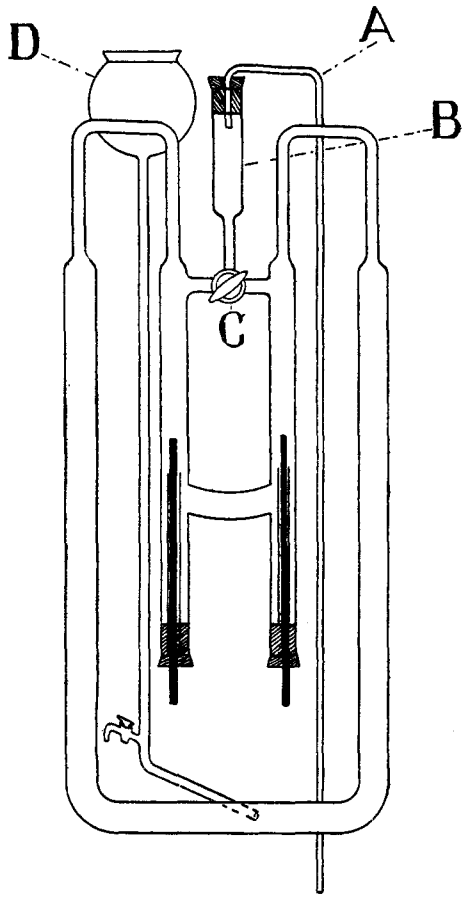
*An Apparatus for the Qualitative Electrolysis of Hydrochloric Acid.*—It is of considerable interest and importance in a course in general Chemistry to be able to show conclusively to the students the relationship between the volumes of hydrogen and chlorine contained in hydrogen chloride. The greater solubility of chlorine renders the determination of this relationship by the electrolysis of hydrochloric acid somewhat difficult, and hence it is frequently classed as an unsatisfactory lecture experiment.

The apparatus with which this experiment is frequently attempted, in which the gases are measured above the electrolyzed solution, is without question unsuited to experiments where one or more of the liberated gases are soluble. Meyer's apparatus[1] has given satisfactory results when carefully manipulated, but the difficulty of making all the necessary adjustments led the author to devise the apparatus here illustrated and described. During the past three years this apparatus has been used in the University of Chicago with excellent results. The manipulation

[1] Ber. 27, 850. (1894).

is as easy as that required for the familiar electrolysis of sulphuric acid, and the results are perfectly satisfactory and certain.

The figure shows the form of the apparatus. The dimensions of the apparatus now in use are as follows: the height is 40 centimeters, the




breadth 22 centimeters, and the larger parts are made of glass tubing having an internal diameter of 12 millimeters. The distance between the two electrodes is 5 cm. The electrodes consist of small battery carbons and are held in place by rubber stoppers. The glass tubes surrounding the electrodes, while not essential, aid in preventing diffusion of the acid. The tube, A, leads into a small vessel containing sodium hydroxide to absorb the chlorine evolved before the acid in the apparatus is completely saturated with that gas. In order to perform the experiment, the apparatus is supported from the two outside tubes by means of two burette clamps. The three-way cock, C, is turned so the side

tube is pointed upward, and hydrochloric acid of from 6-10 normal concentration is poured down the tube B, until the electrodes are somewhat more than covered. A little water is next poured down the funnel tube, D, and the apparatus is tipped so that the water flows toward the side to which the negative pole of the battery is to be attached, and the two side tubes are then filled to the same level with water saturated with chlorine. The pure water will then be on the top of the column next to the hydrogen evolved. The electrodes are attached to a storage battery or direct current lighting circuit reduced to give about 10-12 volts, and a current of about 1 ampere. The evolved gases are conducted out of the apparatus through A until the two gases seem to be evolved at the same rate. A turn of the cock, C, to a position illustrated in the Figure diverts the gases to their respective sides of the apparatus to be measured.

R. H. BROWNLEE.

UNIVERSITY OF CHICAGO.

---

*Note on Recharging Oxygen Gas Tanks.*—As it costs about $15, including the express charges and customs duties, to send an oxygen tank from here to New York City to be filled, we have adopted Hempel's method[1] of generating oxygen to the filling of such a tank.

To set up the apparatus a heavy brass coupling was screwed to the oxygen outlet of the tank, threaded to take an iron T pipe of one-half inch inside diameter. Into one opening of the T was screwed a pressure gage reading up to 200 pounds. The generator was made of a piece of double extra heavy steel pipe, 2 feet long by 2 inches in diameter, one end closed by a steel coupling and a heavy cast iron plug. The other end had fitted to it a suitable reducing nipple and a piece of one-half inch pipe 6 feet long threaded at the end. The mixture for generating oxygen was prepared by heating one kilo of manganese dioxide for about six hours on a thin steel plate over four Bunsen burners in order to burn off all organic matter. The commercial article on hand was far from pure, containing bits of sawdust, roots and trash very intimately mixed, and this preliminary heating was quite necessary. After cooling the peroxide, it was all passed through a 40-mesh sieve and then mixed with one kilo of potassium chlorate also ground to pass a 40-mesh sieve. Four hundred grams of the mixture were used for charging the generator. The generator was then ready to connect to the tank, but both the generator and the connecting pipes were heated to a red heat for a few minutes to get rid of the oil used by the gas fitters, a precaution

[1] Hempel's Methods of Gas Analysis, translated by L. M. Dennis, p. 360.