expensive for class work unless the class is small enough so that each student can have a large amount of individual attention.

Figs. 1 and 2 show a titration vessel which I have designed for class use. It has given satisfactory results in the class room and has displaced other forms of titration vessels in our research Laboratories.[1]

The vessel (Fig. 1) which is made of Pyrex glass holds about 150 cc. of solution. It is obovoid in shape, the lower conical end terminating in a solid glass rod which serves to support the vessel in a metal base. The vessel is not permanently attached to the base and can readily be removed for washing and other purposes. From the rounded top, 4 tubulatures arise, 3 of which are in a line, with one in the center. The tubulature at each end of the row is for the calomel and hydrogen electrodes. The hydrogen electrode is of the usual bubbling type. The center tubulature is for the buret. Both the electrodes and the buret are supported by rubber stoppers. The tubulatures are set at such an angle as to bring the ends of the electrodes close together at the bottom of the titration vessel, making it possible to use a small quantity of liquid. The buret drops its liquid directly into the solution; thus none is lost by striking the electrodes or the sides of the vessel.

The fourth tubulature is convenient for introducing material such as indicators into the vessel, thus obviating the necessity of disturbing the buret or electrodes. It is closed with a rubber stopper which may be provided with a small opening to serve as a vent when the bubbling electrode is used. With all the tubulatures closed, the vessel serves very well for the "still" hydrogen electrode.

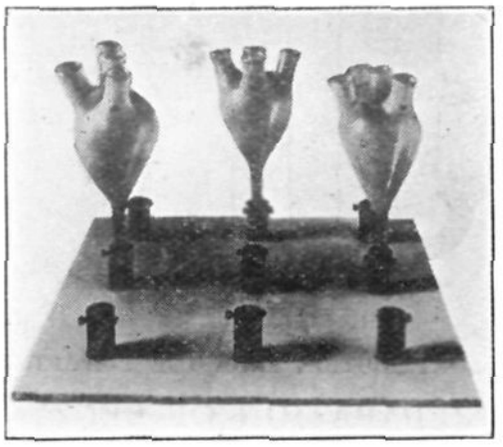

Fig. 3.

For research work I have used a larger support which will hold 9 titration vessels and their electrode equipment, Fig. 3. By using a commutating switch the variations in the hydrogen-ion concentrations of a number of solutions may be followed quite easily. The larger support is of white porcelain and enables one to observe readily the changes in color of indicators.

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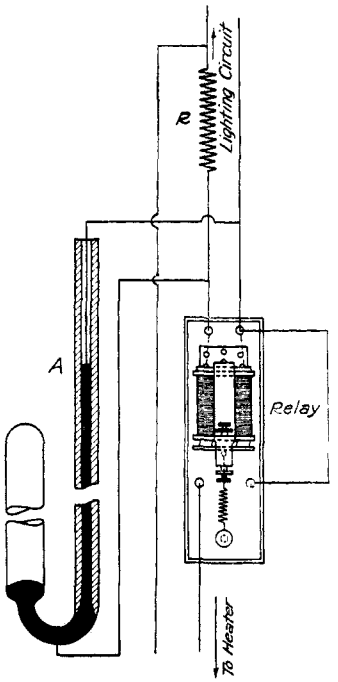
Regulator Circuit.[2] —A relay is ordinarily connected to a thermostat regulator in such a way that the electrical current is broken and a large part of the energy of the electro magnet is dissipated in a spark at the mercury surface of the regulator. As a consequence, rapid fouling of the mercury

[1] The Arthur H. Thomas Company, of Philadelphia, has kindly consented to list the vessel with electrodes complete in its catalogue.

[2] Published by permission of the Secretary of Agriculture.



takes place. A condenser is sometimes employed for absorbing this energy. It is much simpler, however, to dissipate this energy through a closed circuit as shown in the accompanying sketch. A low resistance relay, say 20 ohms, is connected in series with a high resistance, R (about 1500 to 1800 ohms) and these in turn are connected to the lighting circuit as indicated. The resistance R is set so that enough current flows to operate the relay. The contacts of the regulator, A, are connected *across* the relay. When the contact is made the relay is short-circuited and its armature released. The energy of the relay coil is thereby dissipated through the closed contact instead of through the open contact and the hot inductive spark eliminated.

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PREPARATION OF BENZYL ESTERS OF SOME HIGH-BOILING ACIDS

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The therapeutic value[2] of certain benzyl esters has recently increased the interest in their preparation. A number of methods have been used with more or less success. The one discussed in this paper is a modification of that used by Bischoff and A. von Hedenstrom[3] by which the ester is made directly from the acid and the alcohol without the use of a catalyst. In all, 8 esters of benzyl alcohol and acids have been prepared with yields varying from 60% in some cases to 90% in others, depending upon the acid.

This method can be used only when the alcohol and acid boil without decomposition at a temperature above the boiling point of water. The apparatus used is very simple.

General Discussion

A Pyrex tube 1 cm. in diameter, varying in length according to the

[1] Abstract of the thesis presented by Gerald J. Leuck in partial fulfilment of the requirements for the degree of Master of Science in the University of Nebraska.

[2] Macht, *J. Am. Med. Assoc.*, **73**, 599 (1919).

[3] Bischoff and von Hedenstrom, *Ber.*, **35**, 4078 (1902).