tration of the ammonium acetate. Rough comparative experiments with sodium acetate and ammonium acetate showed that the solubility of lead sulphate in solutions of these two salts is of about the same magnitude.

These facts all indicate that the increased solubility of lead sulphate in acetate solutions arises mainly from the formation of unionized lead acetate by metathesis.

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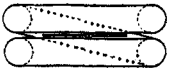
NOTE.

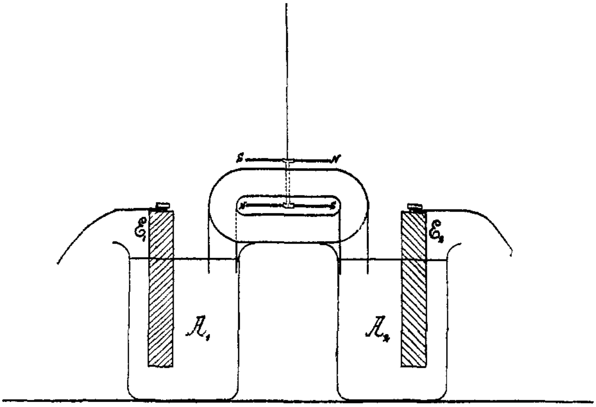
A Method of Measuring Electric Currents in Solutions for Lecture Purposes.—In order to demonstrate the existence of electric currents in electrolytes it has always been necessary to use measuring instruments in an external metallic circuit. Such methods furnish but indirect information about the direction and intensity of the current in the solution.

The instrument described below, remedies these deficiencies. It permits the direct measurement of the currents passing through the interior of a cell, and renders it possible to demonstrate the analogy of electrolytic and metallic conduction by a simple and comprehensive lecture experiment.

The apparatus consists of two half-cells A_1 and A_2 which contain exchangeable electrodes E_1 and E_2 immersed in the electrolytes that are to be examined. A glass tube, having the shape of a solenoid with one or two coils, and filled with a well-conducting solution, furnishes the electrolytic connection between the cells; while the external current can be closed by means of a switch connected by wire with both electrodes. With the aid of this arrangement it is possible to construct any galvanic cell. If, for instance, EE_1 is a carbon plate in nitric acid, E_2 a zinc electrode in dilute sulphuric acid, the common Bunsen element is formed, the solenoid playing the rôle of a porous cell. If E_1 is lead, E_2 lead covered with peroxide, and the liquid throughout the cell sulphuric acid, a storage cell is obtained, etc. As soon as the external circuit is established, discharge of the ions takes place at the electrodes, and there is a continuous migration through the electrolyte in the solenoid. That the internal current thus formed is actually identical with the current in the metallic circuit (but of opposite direction, from the negative to the positive plate when used as a battery) is shown by the deflection given an astatic needle, which swings freely in the coils of the solenoid over a graduated scale.

The deviation, which amounts to nearly 90°, if a difference in potential of over 1 volt exists between E_1 and E_2 (as is the case in most of the common cell combinations), and if the solenoid is filled with concentrated solutions, can be made visible in the lecture room by aid of a mirror attachment. For exact observations, or for measuring feeble currents, such as are formed if identical electrodes in solutions of slightly different concentration are used, the instrument should be put under a glass case, or readings made with the telescope.





The following dimensions were used in the construction of the electrolyte galvanometer:

Half-cells—Jena beakers of about 100 cc.

Solenoid—Thickness of walls, 0.7 mm.; inner diameter of tube, 8 to 12 mm.; total length of tubing, 25 cm.; inner long axis of solenoid, 4 cm.; inner short axis, 0.5 cm.; length of needles, 2 to 3 cm.; distance of the two needles, 15 mm.; surface of electrodes, about 100 sq. cm.

The whole is mounted on a stand of the kind used in electroanalysis. The electrodes are fixed in electrode holders, and the astatic needle is suspended by a cocoon fiber to the glass rod, which for this purpose is bent at the top. The external circuit should pass at a distance of at least 10 cm. from the solenoid, in order to avoid any disturbing influence upon the needle.

Using polished platinum plates as electrodes and 30 per cent. sulphuric acid as an electrolyte, the instrument showed a total internal resistance of about 50 ohms. The resistance did not change more than 0.5 per cent. when electrodes of somewhat different size were used, or when they were moved as much as 2 cm. from their original position, nor did filling of the fluid in the cells to different levels cause an appreciable change in the resistance. The total resistance of the instrument is always very nearly equal to the calculated resistance of the solenoid. These facts simplify the calculation of results, if the instrument is used for measuring purposes.

It may be mentioned that the electrolyte galvanometer can be used to advantage for measuring alternating currents. For this purpose it is only necessary to fill it with sodium phosphate solution, and to use one aluminium and one platinum electrode. Owing to the insulating layer of aluminium oxide, which is formed instantaneously if aluminium acts as anode, the current (as Graetz and others have shown) can only pass in one direction, and the direct current thus formed deflects the needle. A rational scale may be easily graduated by comparison with an electrodynamometer.

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REVIEW OF FOREIGN WORK IN AGRICULTURAL CHEMISTRY.

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OWING to the vast amount of research which has been done along the lines of agricultural chemistry during the last few years it has