

with re-distilled water. The tubes were dried by a current of air, drawn through a drying train to ensure freedom from dust. Too great care in washing cannot be exercised if smooth action is desired.

The mercury was washed in dilute nitric acid and distilled. After the first distillation, the still was carefully cleaned and the mercury re-distilled into the electrometer tubes as needed. The electrolyte for the major part of the work was 25 per cent sulphuric acid. The platinum wires for connecting to the mercury in the electrometer were carefully cleaned before inserting and all points in the connecting tubing were either welded or they were sealed with wax in the case of glass-rubber connections. If carefully prepared, there is no sign of any leakage of air from the apparatus, practically no leakage of charge, no trace of local emf. when on closed circuit, or creeping on open circuit.

For charging the electrometer, a simple potentiometer consisting of a stretched nichrome wire provided with sharp-edged moveable contacts, was used. This potentiometer wire was connected in series with a rheostat, a millimeter and a storage cell. The wire itself was carefully tested and found to be uniform and the contacts were without appreciable resistance. The latter point is very important for low potentials, as any irregularity in contact leads to incorrect values of the capacity.

The excursions of the electrometer were measured with a micrometer microscope mounted on a micrometer slide.

CAPACITY MEASUREMENTS

Since the capacity of any electrometer depends on the position of the meniscus in the tube, all observations of the capacity for purposes of comparison must be made at the same point in the tube. The capacity can be measured by the method of mixtures using the electrometer itself instead of a galvanometer, but a better method is to charge a standard condenser to a known potential and allow it to share its charge with the uncharged electrometer. The condenser is charged to the desired P.D. which is known from the potentiometer to which it is connected. Next, the condenser is insulated from the source of supply and connected to the electrometer. The excursion of the meniscus is noted and then a second connection to the potentiometer gives the P.D. after the mixture. When the condenser is charged to a new P.D. the position of the meniscus is adjusted by changing the pressure so that the meniscus always comes to rest at the same point in the tube throughout the series.

The method of charging the electrometer and allowing it to share its charge with a standard condenser is not satisfactory owing to the