

Then either the acid solution is forced back by the return of the meniscus after wetting, which is not at all likely, or it creeps up of itself between the acid and mercury.

In a paper on the Angle of Contact¹ it was shown that when the angle of contact made with glass by a mercury surface covered with dilute sulphuric acid is zero, the acid creeps between the mercury and glass. Further experiments show that this creep always occurs with H_2SO_4 at least when the concentration is higher than one-half of one per cent. A large number of tubes was prepared by washing with aqua regia, water, potassium hydrate and distilled water. Distilled mercury was placed in the tubes and covered with dilute sulphuric acid. Many different sizes of tubes were used in order to study a possible effect depending on the diameter of the tube. While the smaller tubes seem to have a larger creep than the larger ones, the occurrence of rapid creep among the large and of small creep among the small tubes render such a conclusion doubtful.

The curves for the creep plotted as total distance against the time are approximately exponential. The acid creeps rapidly during the first few hours and then more and more slowly until it becomes almost stationary. Its rate depends so much on the cleanliness of the glass surface that the line between the wetted and unwetted portion, which is very sharp and distinct at first, becomes less and less distinct until it is difficult to follow. Some have been followed for several weeks. Measurements of the electrostatic capacity of these layers show that with constant potential difference the capacity is probably proportional to the area.

Further, the rate of creep depends on the pressure, so that as the acid descends in the tube it reaches regions of greater and greater pressure, so that the motion is slower and slower. If we take a tube small enough to make it possible to invert it without the mercury escaping, the creep is very rapid, in some cases so rapid that it is difficult to follow.

It is easy then to account for the high value of the capacity of the electrometer as used in the above experiments. The acid rises rapidly for some distance in the tube and the wetted area in the conical tube is many thousand times the area of the meniscus.

Experiments show that if the mercury in the tube is the cathode, the rate of creep is diminished by a potential difference applied to the electrometer and increased if the mercury is the anode. But these effects are small and do not explain the changes in capacities observed.

¹ Clark. Trans. Roy. Soc. Can., XII, 51, 1918.