I. UPON THE REDUCTION OF METALLIC OXIDES IN SUNLIGHT.

By Dr. Albert R. Leeds.

During the course of some experiments upon the measurement of solar actinism, I was led to subject certain metallic oxides to the influence of sun-light during a very prolonged period and under somewhat novel conditions. The oxides were contained in W-shaped tubes, from which the air was displaced by a current of pure and dry hydrogen continued during five hours. After exhausting the atmosphere of hydrogen as completely as possible, the tubes were sealed. The oxides were placed in one bend of the tube, and in the other bend metallic sodium, or, in some experiments, anhydrous cupric sulphate. All of the tubes were filled upon the 10th of November, 1880, and exposed at a southern window until Nov. 10th, 1881, when they were examined and opened.

I. A tube with 5.2256 grms. mercurous oxide in one bend, and sodium in the other. The oxide was largely reduced to metallic mercury, which formed a mirror with globules, and to *yellow* mercuric oxide. The sodium was covered with a white crust. On account of the mingling of the globules of mercury with the reduced and unreduced mercurous oxide, no quantitative estimations could be effected.

II. A V-tube containing 5.4064 grms. mercurous oxide, but no sodium. A mercury mirror was formed, and the residue consisted of a mixture of mercurous oxide and *yellow* mercuric oxide. As in the preceding experiment no red oxide of mercury was found.

The two preceding experiments are at variance with the results of Dulk, quoted in Gmelin-Krauts Handb. der Anorg. Chemie. Vol. I, p. 825, according to which the mercurous oxide was resolved into mercury and *red* oxide of mercury.

III. A W-tube containing 6.3597 grms. red oxide of mercury in one bend and metallic sodium in the other. No decomposition ensued, the weight remaining unaltered. This result likewise differs from that of Dulk (loc. cit.), who found that dry mercuric oxide lost in 4 months under colorless glass 0.9, under violet 0.5, under green 0.2 and under red 0.1 per cent. of oxygen. At the same time its color changed to gray, most strikingly under colorless, but scarcely perceptibly under red glass.

IV. A W-tube containing 3.043 grms. of pure PbO_2 in one bend and metallic sodium in the other. The weight and appearance of the peroxide remained unaltered.

This result differs from that of Dulk (loc. cit.), the brown oxide of lead being decomposed into oxygen and the red oxide.

V. 4.057 grms. of PbO_2 was used in this experiment, but instead of sodium, anhydrous cupric sulphate was placed in the other bend of the tube. Neither the lead peroxide nor the copper salt changed in appearance, nor the former in weight.

II. ON THE ESTIMATION OF TANNIC ACID IN TANNING MATERIALS, ETC.

By Nelson H. Darton.

As the exact determination of the proportions of tannic acid is a problem of comparatively difficult solution many methods have been proposed to facilitate this, but, as a rule, have yielded very discordant results when compared with the actual weights of the leather formed from it. Thus tanners have lost all faith in chemists generally. Some prominent tanners have informed me that they have sent spent barks containing less than one per cent of tannic acid to chemists in this city and they have returned results of from 7 per cent. to 4 per cent. These results were generally obtained by Hammer's hide method or that of Lœwenthal, as modified by Neubauer, or even by the old gelatin method, which is now seldom used.

In my intimate connections with the tanning trade I seriously felt the defects in and want of a proper method, and not being able to find one of sufficient accuracy sought out one that would answer the conditions of speed and accuracy, and this I will detail below, merely mentioning that in numerous and exhaustive trials I have found it to yield results as near as within ¼ per cent of the actual value. Lœwenthal's modification of his own method is not nearly as accurate as this, as I will show in a subsequent paper.

The bark, etc., is taken dry and finely cut, powdered or crushed. 20 grammes of this is weighed out, placed in a flask with sufficient water and the tannic acid thoroughly exhausted by repeated treatments with boiling water. The filtrate is mixed with about 25 cc. of dilute sulphuric acid and again filtered after making the bulk up to one litre. Standard solutions are then prepared. The first of tannic acid containing two grammes to a litre. The pure tannic acid must be used. 2nd, a solution contain-