A manual of chemistry

Physical and inorganic chemistry

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Ozone or Active Oxygen.—It has long been known that dry oxygen or atmospheric air, when exposed to the action of a series of electric sparks, emits a peculiar and somewhat metallic odour, which may also be imparted to moist oxygen by allowing phosphorus to remain in it for some time, and by several other processes. This odorous principle also possesses several properties not exhibited by oxygen in its ordinary state, one of the most characteristic being the liberation of iodine from potassium iodide. It has been the subject of many researches, especially by Schonbein of Basle, who proposed for it the name of Ozone.

An easy way of preparing ozone is to subject ordinary oxygen to the action of the silent electric discharge, or electric effluvium. For this purpose a stream of the gas is passed through a tube into which is sealed a pair of very finely pointed platinum wires with their points at a little distance apart, one being connected with an electrical machine, and the other with the ground. No sparks must be allowed to pass, as in that case a considerable portion of the ozone would be reconverted into ordinary oxygen. Siemens prepares ozone by induction; he forms a sort of Leyden-jar by coating the inner surface of a long glass tube with tin-foil, and enclosing this within a wider tube coated with tin-foil on its outer surface. Between the two tubes a stream of pure dry oxygen is passed, which, when the inner and outer coatings are connected with terminal wires of an induction-coil, becomes electrified by induction. By this means from 10 to 15 per cent. of the oxygen may be converted into ozone.

Ozone is also produced in small quantity by suspending a stick of phosphorus in a bottle filled with moist air; in the electrolytic decomposition of water, and in the action of strong sulphuric acid on potassium permanganate. There has been considerable discussion about its nature and composition, but the most trustworthy experiments seem to show that it is merely a modified form of oxygen.

Ozone is insoluble in water and in solutions of acids or alkalis, but is absorbed by a solution of potassium iodide. Air charged with it exerts an irritating action on the lungs. It is decomposed by heat gradually at 100°, instantly at 290°. It is an extremely powerful oxidising agent, possesses strong bleaching and disinfecting powers; corrodes cork, caoutchouc, and other organic substances: oxidises iron, copper, and even silver when moist, as well as dry mercury and iodine. Paper moistened with a mixture of starch and potassium iodide is instantly turned blue when exposed to its action. Now when paper thus prepared is exposed to the open air for five to ten minutes, it often acquires a blue tint, varying in intensity at different times. Hence it is supposed that ozone is present in the air in variable quantity.