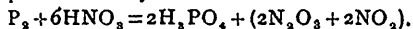


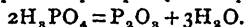
(1) It acts powerfully upon animal matter, skin, wool, etc., turning it yellow.

(2) Boil flowers of sulphur in strong nitric acid. They will dissolve, lower oxides of nitrogen being given off as red fumes, and if the solution be diluted and barium chloride (Ba Cl_2) added, a white precipitate of barium sulphate (Ba SO_4) will be thrown down. The nitric acid has oxidized the sulphur up to sulphur trioxide (H_2O , $\text{SO}_2 = \text{H}_2\text{SO}_4$).

(3) Heat phosphorus in nitric acid. The phosphorus will slowly disappear, and lower oxides of nitrogen be given off. By evaporating and boiling the colourless liquid, phosphoric acid may be obtained.



The nitric acid has in this instance oxidized the phosphorus up to phosphorus pentoxide.



(4) Pass sulphuretted hydrogen, H_2S , into nitric acid gently heated.

Red fumes of the lower oxides of nitrogen will be given off, and the hydrogen and sulphur will be oxidized, the former to water, the latter to sulphur dioxide SO_2 .

(5) Throw the metals tin and antimony into dilute nitric acid; yellowish white powders, representing the oxides of these metals, will be formed, and lower oxides of nitrogen given off.

(6) Pour strong nitric acid upon red-hot powdered charcoal contained in a crucible; the charcoal will burn most brilliantly, oxygen being given to it by the nitric acid.

Nitrates have also strong oxidizing properties, and are used to supply oxygen to bodies which are to be burned out of contact with air.

Make a mixture of one part of charcoal, three parts of nitre, and half of sulphur, and place it in a crucible standing in a plate of water. Cover the crucible with a bell-jar having a neck, and fill the jar with carbon dioxide by downward displacement. Touch the mass with a red-hot iron; a sheet of flame will rise, the nitre giving oxygen to the carbon and the sulphur, CO_2 and SO_2 , resulting.

(ii.) Sulphuric acid, H_2SO_4 , is added to the liquid to be tested, to insure the presence

of free nitric acid; this free nitric acid oxidizes the ferrous sulphate, FeSO_4 , up to ferric sulphate, $\text{Fe}_2(\text{SO}_4)_3$, and is itself reduced to nitric oxide, NO . It is the solution of the nitric oxide in ferrous sulphate, FeSO_4 , which produces the brown colour.

A beautiful illustration of this action may be given by passing bubbles of nitric oxide into a solution of ferrous sulphate; the gas will be absorbed, and the liquid turned almost black.

(iii.) Gold, platinum, and aluminium alone, among the common metals, resist the action of nitric acid; all the others are either dissolved by it as nitrates, or converted into oxides.

IV. Give a complete digest of carbon.

(i.) *Symbol* C.C.W., 12.

(ii.) *Occurrence*. 1. *Free*. (a) Diamond, India (Golconda), Borneo, the Cape, the Brazils.

(b) Graphite, or plumbago. Borrowdale in Cumberland, Siberia, Ceylon.

(c) Charcoal (coal), in almost every country.

2. *Combined*. (a) In all animal and vegetable substances without exception.

(b) With oxygen as CO_2 in air and dissolved in water.

(c) In a great many minerals, chalk, limestone, CaCO_3 , forming whole mountain chains; also in carbonates of magnesia, barium, and strontium, as MgCO_3 , BaCO_3 , SrCO_3 , etc., etc.

(iii.) *Preparation*. (1) We are altogether unacquainted with the mode in which the diamond has been formed.

(2) Graphite. (a) Some forms of natural graphite are nearly pure.

(b) Coarse impure graphite is purified by heating the powder with sulphuric acid, H_2SO_4 , and potassium chlorate, KClO_3 . A compound is formed which, when strongly heated, decomposes, leaving pure graphite as a bulky, finely divided powder. Pressure gives coherency to the mass.

(3) Charcoal is obtained by heating animal or vegetable matter to redness, in a vessel nearly closed; the volatile matters