

holder. C. Receiver. D. Block of wood serving as support for receiver. e. Source of heat. F. Cloth kept wet with cold water.

(iii.)  $H_2SO_4$  and  $HNO_3$  would change the blue of the solution of litmus to red.  $KNO_3$  would not affect the colour of the solution of litmus.

$$2. 98 : 63 = X : 3\frac{1}{2}.$$

$$X = \frac{686}{126} = 5.44 \text{ lbs. of } H_2SO_4.$$

3. To affect chemical union between substances capable of combining, it is requisite that they be raised to a certain temperature termed the "temperature of ignition," which differs for different substances. To prevent the flame of Davy's lamp from raising the temperature of explosive gases into which the lamp may be immersed to the temperature of ignition, Davy surrounded the flame of his lamp by wire gauze. The gauze admits the explosive gases to the flame, but confines their combustion within the gauze, the conductivity of the latter (by distributing and radiating the heat resulting from combustion) preventing the gases exterior to it from reaching the temperature required to explode them.

4. (i.) *Apparatus for the preparation of Hydrogen.*

(1) A wide mouthed bottle capable of holding a pint or more.

(2) A paraffined cork bored through twice and fitting gas tight into the mouth of bottle (1).

(3) A funnel tube long enough to reach within an inch of the bottom of bottle (1), fitted into one of the borings of the cork.

(4) A glass tube 6 inches long, bent at right angles, one limb of which is pushed through the other boring of the cork far enough to clear its lower surface.

(5) Rubber tubing to connect tube, (4), with gas bag or other apparatus for storing the hydrogen.

*Apparatus for the preparation of Nitrogen.*

(a) A pneumatic trough provided with shelves and filled with water to cover the shelves one inch.

(2.) A porcelain capsule containing some phosphorus.

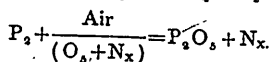
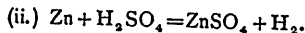
(3.) A tubulated bell jar placed over capsule (2) and resting on shelves of trough (1).

*Substances necessary for the preparation of Hydrogen.*

Granulated zinc or sheet zinc in scraps, sulphuric acid and water.

*Substances necessary for the preparation of Nitrogen.*

Air and phosphorus.



(iii.) To demonstrate the low specific gravity of Hydrogen:

(a) Decant the gas upward from one bell jar to another.

(b) Fill soap bubbles with the gas.

(c) Suspend an inverted beaker from one arm of the beam of a balance, counter-balancing it with weights placed in the scale-pan attached to the other arm of the beam. Allow hydrogen to stream up into the beaker. The scale-pan will now descend, proving the hydrogen to be lighter than air.

The combustibility of Hydrogen may be demonstrated:

(a) By igniting the hydrogen streaming through a glass tube with narrow bore, or

(b) By igniting the gas contained in a bell jar, holding the jar mouth downward and applying the light at the mouth.

To prove that Hydrogen is not a supporter of combustion, plunge an ignited wax taper upward into a bell jar filled with hydrogen and held as described in (b) previous answer.

Properties of Nitrogen are wholly negative. It is neither combustible nor a supporter of combustion. This is readily demonstrated.