



- (a) Pass a little H_2S into 5cc antimony solution. $\longrightarrow$
- (b) Add 8cc hydrochloric acid (sp. gr. 1.175). $\longleftarrow$
- (c) Add 5cc antimony solution. $\longrightarrow$
- (d) Heat, not to boiling. $\longleftarrow$
- (e) Cool again, in a dish of water. $\longrightarrow$
- (f) Add 6cc of the acid. $\longleftarrow$
- (g) Pass in H_2S under pressure. $\longrightarrow$
- (h) Reduce pressure by filter-pump. $\longleftarrow$

Notes. (c) If the addition of antimony does not bring down a fairly heavy precipitate, hydrogen sulphide should be passed in again, or there will be no precipitate in (e). (e) Cool only until a precipitate appears, then add the acid (f) and finish cooling; if too much precipitate is formed it dissolves very slowly in the acid. (g) With a rubber "syringe" (bulb and two valves) a pressure of about one metre of mercury above the atmospheric pressure may be maintained; if (g) and (h) be attempted, a small round bottomed flask with a perforated rubber stopper and tap should be used. It should be well tested for leaks before the experiment.

Steam and hot iron. Steam passed over hot iron converts it into the magnetic oxide with liberation of hydrogen; hydrogen, on the other hand reduces the magnetic oxide to iron with formation of steam. The reaction



is in equilibrium when the gaseous solution reaches a certain composition, which depends on the temperature.

"NON-REVERSIBLE" REACTIONS. CONTINUITY.

When zinc dissolves in sulphuric acid, hydrogen gas is given off and a solution of zinc sulphate is formed. In view of the numerous reactions discussed in the preceding paragraphs it might be thought possible to get the zinc and acid back again by the action of hydrogen under high pressure on the solution; this has not proved possible, however, and as the original substances cannot be recovered from the products of the reaction by change of temperature, pressure, or the concentration of the solution, the reaction is usually spoken of as "non-reversible."

It is non-reversible, however, only in a narrow technical sense; for if a current of electricity be passed from a platinum plate charged with hydrogen, through a solution of zinc sulphate to another platinum plate, the hydrogen and the sulphate turn into sulphuric acid and zinc—the reaction is thus reversible by electrical means, though not by change of temperature, pressure, or concentration.