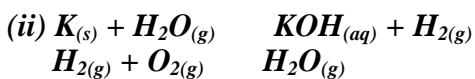


Water and hydrogen

1. (a) Aluminium is above hydrogen in the reactivity series of elements
(b) (i) The reaction is too exothermic that a lot of heat is produced causing ignition of hydrogen in presence of oxygen

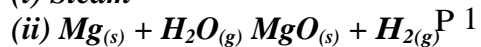


2.

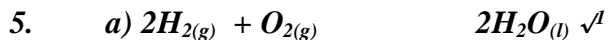
3. a) Calcium chloride
Drying agent



4. (i) Steam



(iii) Gas P is passed through the combustion tube before heating is commenced



b) – Turns anhydrous white paper ✓^{1/2} copper (II) sulphate into blue. ✓^{1/2} Or

- Turns anhydrous blue ✓^{1/2} cobalt (II) chloride into pink. ✓^{1/2}

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Hydrogen

7. (a) N
 (b) $4\text{H}_2\text{O}_{(g)} + 3\text{Fe}_{(s)} \quad \text{Fe}_3\text{O}_4_{(s)} + 4\text{H}_2_{(g)}$ (Not balanced 0mk)
8. (a) B.E P ½
 (b) $\text{Pb}^{2+}_{(l)} + 2e^- \quad \text{Pb}_{(s)}$ S.S P ½
 (c) P1
9. (a) $\text{Zn}_{(s)} + 2\text{HCl}_{(aq)} \quad \text{ZnCl}_2_{(aq)} + \text{H}_2_{(g)}$ P1
 (b) Concentrated sulphuric (IV) acid or anhydrous calcium chloride. P1
 (c) Copper cannot displace hydrogen from its solution. P1
 (d) (i) $2\text{H}_2_{(g)} + \text{O}_2_{(g)} \quad 2\text{H}_2\text{O}_{(l)}$ P1
 (ii) Before: Pass hydrogen / through the tube before lighting P1 to drive off air.
 End: There should be a continuous flow of hydrogen after / putting off the flame to avoid an explosion. P1
- (e) – Filling balloons P1
 - Manufacture of margarine.
 - Manufacture of ammonia.
 - Conversion of coal to synthetic petrol.
- (f) $\text{Zn}_{(s)} + \text{H}_2\text{O}_{(g)} \quad \text{ZnO}_{(s)} + \text{H}_2_{(g)}$ P1
 (g) S, P ½ P, P ½ Q, P ½ R, P ½
 (h) It adds to unsaturated oils and hardens them. P1
10. a) i) Heating of copper (ii) Oxide to be shown on the diagram
 ii) To drive out air because mixture of air and hydrogen is explosive when lit
 iii) $\text{CuO}_{(g)} + \text{H}_2_{(g)} \quad \text{Cu}_{(g)} + \text{H}_2\text{O}_{(g)}$
 (penalize ½ mark for wrong S.S)
 iv) To prevent re-oxidation of hot copper by the atmospheric oxygen
 v) Reducing agent
 vi) Black copper (ii) Oxide turns to brown showing that copper (ii) Oxide has been reduced to copper
 vii) Zinc is more reactive than hydrogen and therefore cannot be reduced by hydrogen
11. (a) Hydrogen gas
 (b) - Calcium react with water forming calcium hydroxide solution
 - Calcium hydroxide solution dissociates to produce calcium ion (Ca^{2+} ions) and hydroxide (OH^-) ions responsible for basic properties.