

ORDINARY LEVEL CHEMISTRY PROBLEMS

PART 6: CARBON AND ITS COMPOUNDS

- 1 (a) (i) Draw a well labelled diagram of the set-up of apparatus that can be used to prepare a dry sample of carbon dioxide in the laboratory
(ii) Write equation that leads to the formation of carbon dioxide
(b) Burning magnesium was lowered in a gas jar of carbon dioxide
(i) State what was observed
(ii) Write equation for the reaction
(iii) Explain your observation
(c) Water was added to the product in (b) and the resultant mixture tested with litmus. State what was observed and explain your observation
(d) When a solution of sodium hydroxide was exposed to air for a long, a white solid was formed on the surface
(i) Name the white solid
(ii) Write equations leading to the formation of the white solid
- 2 (a) (i) Draw a labelled diagram to show how a dry sample of carbon dioxide can be prepared in the laboratory
(ii) Write equation leading to the formation of the carbon dioxide
(b) Carbon dioxide was bubbled into a solution of calcium hydroxide for a long time
(i) State what was observed
(ii) Write equations for the reactions that took place
(iii) Explain your observations
(c) Burning magnesium was lowered into a gas jar of carbon dioxide
(i) State what was observed
(ii) Write equation for the reaction
(iii) Explain your observation
- 3 (a) (i) What are allotropes
(ii) Name one element that shows allotropy apart from carbon
(b) (i) Give the allotropes of carbon
(ii) State two properties of one of the allotropes of carbon
(iii) Explain how the allotrope is used due to its properties you have named
4. (a) Name the element present in pure charcoal
(b) Explain why it is dangerous to use a charcoal stove in a poorly ventilated room
(c) Write equation for the reaction between charcoal and heated iron(III) oxide
5. (a) A solution of sodium carbonate was added to a solution of calcium ions
(i) State what was observed
(ii) Write equation for the reaction
(b) State the application of this reaction
(c) Dilute hydrochloric acid was added to the mixture formed in (a)
(i) State what was observed
(ii) Write equation for the reaction

6. (a) Draw and name the structure adapted by diamond
 (b) State the physical properties of diamond
 (c) What use is made of diamond due to the properties you have named

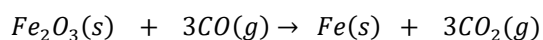
7. (a) State what is observed when sodium carbonate is added to each of the following solutions
 (i) Aqueous calcium hydroxide
 (ii) Dilute sulphuric acid
 (b) Sodium carbonate crystals were exposed to air for a long time
 (i) State what was observed
 (ii) Explain your observation

8. (a) Name the two crystalline forms of carbon
 (b) State two differences between the allotropes you have named
 (c) Give two uses of each allotrope

9. (a) Sodium carbonate was added dissolved in water and the resultant solution tested with litmus paper
 (i) State what was observed
 (ii) Explain the observation
 (b) Sodium carbonate was added to a solution of magnesium sulphate
 (i) State what was observed
 (ii) Write equation for the reaction that takes place

10. (a) Give a reason why
 (i) Graphite conducts electricity whereas diamond does not
 (ii) Diamond is used as a cutting tool whereas graphite is used to mark paper
 (b) Describe the proof for allotropy
 (c) State conditions and write equations for the reaction between carbon and oxygen

11. (a) Describe the structure of graphite
 (b) State two properties in which graphite differs from diamond
 (c) Graphite was heated in excess air and the gas given off passed through aqueous calcium hydroxide for a long time
 (i) State what was observed
 (ii) Write equations for the reactions
 (d) Carbon monoxide reacts with iron(III) oxide according to the following equation



If excess carbon monoxide was passed over 3.5g of hot iron(III) oxide, calculate the volume of carbon dioxide evolved at s.t.p

12. (a) Carbon dioxide was passed through a saturated solution of calcium hydroxide until there was no further change
 (i) State what was observed
 (ii) Write equations for the reactions that took place
 (b) Soap solution was added to the resultant mixture in (a).

- (i) State what was observed
 - (ii) Write equation for the reaction that took place

- 13. (a) Name a reagent that can be used to distinguish between the CO_3^{2-} ion and the HCO_3^- in solution. State what is observed when the reagent you have named is used
- (b) Explain why carbon dioxide cannot be prepared from
 - (i) Calcium carbonate and sulphuric acid
 - (ii) Lead(II) carbonate and sulphuric or hydrochloric acids
- (c) State what is observed and write equation for the reaction that takes place when the following are heated
 - (i) Magnesium carbonate
 - (ii) Calcium carbonate
 - (iii) Copper(II) carbonate
 - (iv) Zinc carbonate
 - (v) Lead(II) carbonate

- 14. (a) Explain how a pure sample of carbon dioxide can be prepared in the laboratory from calcium carbonate and write the equation for the reaction that takes place. (diagram is not required)
- (b). Explain with aid of equations the changes that take place when excess carbon dioxide is bubbled into sodium hydroxide solution
- (c). Potassium hydrogencarbonate decomposes when heated according to the following equation

$$2KHCO_3(aq) \rightarrow K_2CO_3(s) + H_2O(l) + CO_2(g)$$

Calculate the mass of carbon dioxide evolved when 8 g of potassium hydrogencarbonate is heated strongly. ($K = 39$; $H = 1$; $C = 12$; $O = 16$)

- 15. (a) Gas P was passed over heated lead(II) oxide. The gaseous product turned lime water milky
 - (i) Identify P
 - (ii) State what was observed when P was passed over heated lead(II) oxide
- (b) Write equation for the reaction between
 - (i) P and lead(II) oxide
 - (ii) The gaseous product and lime water
- (c) State the uses of carbon dioxide

- 16. (a) Carbon dioxide was bubbled into concentrated sodium hydroxide solution
 - (i) State what was observed
 - (ii) Explain your observation
 - (iii) Write equations for the reactions
- (b) Describe the laboratory preparation of the following
 - (i). Sodium carbonate crystals
 - (ii). Sodium hydrogen carbonate
 - (iii). Magnesium carbonate
- (c) Carbon monoxide was passed over heated zinc oxide.
 - (i) State what was observed

- (ii) Write equation for the reaction
17. (a). (i). Draw a labelled diagram of the set-up of apparatus that can be used to prepare a dry sample of carbon dioxide
- (ii). Write equation for the reaction leading to the formation of carbon dioxide
- (b). Explain the reason for your choice of the
- (i). Drying agent for carbon dioxide
- (ii). Method of collecting carbon dioxide as shown in your diagram in (a)(i)
- (c). Write equation(s) to show the reaction of carbon dioxide with
- (i). Water
- (ii). Sodium hydroxide
- (d). State
- (i). Why carbon dioxide is used in making fire extinguishers
- (ii). The effect of increased concentration of carbon dioxide on the environment

END