END OF TERM 1 EXAMINATION

S4 CHEMISTRY (P545/2)

INSTRUCTIONS: ATTEMPT ALL QUESTIONS IN SECTION A AND ANY TWO FROM SECTION B

DURATION: 2 HOURS: 15 MINUTES

1. During an experiment, a beam of light was passed through a dark room and dust particles were seen moving in all directions.

a) State;

i. Why the dust particles moved in all directions. (02 marks)

ii. What the experiment indicated. (01 mark)

b) The temperature of the room was increased:

i. State the was observed. (01 mark)

ii. Give a reason for your answer in (b) i. above. (01 mark)

2. a) Calcium was burnt in air. Write equation for the reaction that took place. (1 ½ marks)

b) Few drops of water were added to the product in (a);

i. State what was observed. (1 ½ marks)

ii. Write equation for the reaction that took place. (1 ½ marks)

c) Name one compound which when heated forms the same product as that in (a) above. (1/2 marks)

3. When excess Carbon monoxide was passed over 4.0g of heated oxide of iron, V, 2.8g of iron was formed.

a. Determine the molecular formula of V (0 = 16, Fe = 56, V = 160) (3 ½ marks)

b. Write equation for the reaction between V and Carbon monoxide. (1 ½ marks)

4. a) Write the structural formula of ethcU1e. (01 mark) b) i. Name two substances that can be used to prepare ethane in the laboratory (02 marks)

ii, State the conditions for the formation of ethane from the compounds you have named in b(i) above. (01 mark)

c) Ethane was bubbled through acidified Potassium manganate (VII) solution. State what was observed. (01 mark)

5. The number of protons, electrons and neutrons in atoms; Q, T, W, and V are shown in the table below.

d) i. State one property under which Sulphuric acid can react with Sodium Nitrate to form Nitric acid. (01 mark)

a) State the;

i. Atomic number of Y.

ii. Mass number of Q (1 ½ marks)

m, Atoms which are Isotopes (01 mark)

b) Identify the atoms that belong to element in the same group of the periodic table. (01 mark)

c) Write the structural formula of the compound formed between T and W. (01 mark)

d) i. State one property of the compound formed between t and W. (01 mark)

6. a) i. State the conditions under which sulphuric acid can react wit sodium Nitrate to form Nitric acid. (01 mark)

ii. Write equation for the reaction in a (i) above. (1 ½ marks)

b) Sulphur was warmed with concentrated Nitric acid:

i.. State what was observed. (01 mark)

ii. Write equation for the reaction. (1 ½ marks)

7. 4.3 litres of hydrogen bromide was bubbled through 700cm3 of 0.lm silver Nitrate solution at room temperature. Calculate;

i. The number of moles of silver nitrate in the solution. (01 mark)

ii. The number of moles of hydrogen bromide bubbled.

(1 mole of gas occupies 241itres at room temperature) (01 mark)

iii. The mass in grams of silver bromide formed. (Ag = 108, Br = 80). (02 marks)

8. a) i. Name two allotropes of Carbon other than Charcoal. (01 mark)

ii. State one of each of the allotropes you have named in a (i) above. (02 marks)

b) i. State the conditions under which sulphuric acid can react with sugar. C_{12} H_{22} O_{11} to form carbon. (01 mark)

ii. Write the equation for the reaction. (1 ½ marks)

9. a) sodium carbonate solution was added to an aqueous solution of hydrogen chloride.

i. State what was observed. (01 mark)

ii. Write equation for the reaction that took place. (1 ½ marks)

b) 2-3 drops of Lead II Nitrate was added to the resultant solution in (a) i.

i. State what was observed. (01 mark)

ii. Write the ionic equation for the reaction that took place. (1 ½ marks)

10. a) Sulphur dioxide can be in prepared by roasting Zinc Sulphide in air according to the following equation;

$2ZnS_{(s)} + 3O_{2(g)} \longrightarrow 2\,S_{O2(g)} + 2\,ZnO_{(s)}$

a) Calculate the volume of Sulphur dioxide evolved at room temperature when 9.7g of Zinc Sulphide is reacted with excess Oxygen. (Zn = 65, S= 32, lmole of gas occupies 4-24dm3 at room temperature.
(2 ½ marks)

b) During the manufacture of Sulphuric acid by the contact process. Sulphur dioxide is heated with Oxygen in the presence of a catalyst.

i. Name the catalyst. (01 mark)

ii. Write the equation for the reaction between sulphur dioxide and Oxygen. (11/2 marks)

SECTION B

11. a) State the difference between fats and oils. (01 mark)

b) Fats and oils can be used to make Soap.

i. Define the term soap. (02 marks)

ii. Briefly describe how soap can be prepared. (03 marks)

c) i. Name two substances which when present in water can call permanent hardness of water.
(02 marks)

ii. State one chemical method of removing permanent hardness of water. (01 mark)

iii. Write the equation for the reaction involved in (c) ii above. (1 ½ marks)

d) Soap was used for washing in hard water:

i. State what was observed. (01 mark)

ii. Write the equation for the reaction. (1 ½ marks)

e) A detergent can be used for washing instead of soap. State one advantage and one disadvantage of using a detergent. (02 marks)

12. a) With the help of equation, outline how a dry sample of ammonia can be prepared in the laboratory using ammonium chloride. (Diagram not required) (04 marks)

b) Draw a labelled diagram of the set up of the apparatus to show that ammonia is very soluble in water.
(03 marks)

c) Using equations where possible, explain why when dry ammonia is passed over strongly heated Lead II oxide, a colourless liquid is formed and a grey solid residue is obtained.
(3 ½ marks)

d) Ammonium nitrate dissolves in water according to the following equation:

$NH_4N0_{3\,(s)} + H20\ (L)\ NH_40H_{(aq)} + HN0_{3(aq)}$

Explain using equations, why extensive use of ammonium nitrate as a fertilizer can make the soil become acidic.

13. Explain the following, illustrating your answers with equations when applicable.

a. When ammonia solution is added drop-wise until in excess to copper II sulphate solution, a blue precipitate is formed. The precipitate dissolves in excess ammonia solution to form a deep blue solution.
(04 marks)

b. Hydrogen gas cannot be prepared using calcium turnings and dilute sulphuric acid.

c. Zinc bromide conducts electricity in both residue dissolved in water, a gas that turns moist red litmus paper blue is evolved. (05 mark)

d. When magnesium is burnt in air and the residue dissolved in water, a gas that turns moist red litmus paper blue is evolved. (05 marks)

-END-