



Dr. Bbosa Science

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545/2

S4 CHEMISTRY

Exam 3

PAPER 2

DURATION: 2 HOUR

INSTRUCTIONS TO CANDIDATES:

SECTION A: Consists of 10 structured questions.

Answer all questions in this section.

Answers to questions in section A should be written in the spaces provided on this question paper.

SECTION B: Consists of Semi – structured questions.

Attempt any TWO questions from this section.

Answers to the question must be written in the answer sheet provided.

In both sections, all working must be clearly shown.

1 mole of a gas occupies 22,400 cm³ at s.t.p

1 mole of a gas occupies 24,000 cm³ at room temperature.

Use the following where necessary

H=1, C=12, O=16, Mg=24, Fe=56

For Examiner's use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	TOTAL

SECTION A**Attempt ALL questions in this section.**

1. Some methods of separation of mixtures are given in the table below. Complete the table by naming a pair of substance which can be separated by the method given and the principle behind the methods. (5 marks)

	Method	Mixture	Principle
Eg	Separating funnel	Water and paraffin	Immiscible liquids
(a)	Fractional distillation		
(b)	A magnet		
(c)	Filtration		
(d)	Sublimation		
(e)	Fractional crystallization		

2. (a) Graphite and lead(II) bromide are conductors of electricity.
Name the particles which are responsible for conducting electricity in. (1 mark)
- (i) Graphite: _____
- (ii) Lead(II) bromide: _____
- (b)(i) Draw a labeled diagram of the setup of apparatus that can be used to electrolyze molten Lead(II) bromide. (2 marks)
- (ii) State what is observed at the anode. (½ mark)
-
- (iii) Write the equation for the observation in (II) above. (1 ½ marks)
-
3. (a) Excess Sodium hydroxide solution is added to a solution of a mixture of Copper(II) nitrate and Zinc Sulphate and the mixture filtrated.
State the color of the (1 mark)
- (i) Filtrate _____
- (ii) Residue _____
- (b) Write the ionic equation leading to the formation of the residue. _____ (1 ½ marks)
- (c) The residue was dried, transferred to a test tube and heated strongly

(i) State what is observed (1 mark)

(ii) Write the equation for the reaction when the residue was heated. (1 ½ marks)

4. Ethene can be prepared in the laboratory using the set of apparatus shown in figure 1

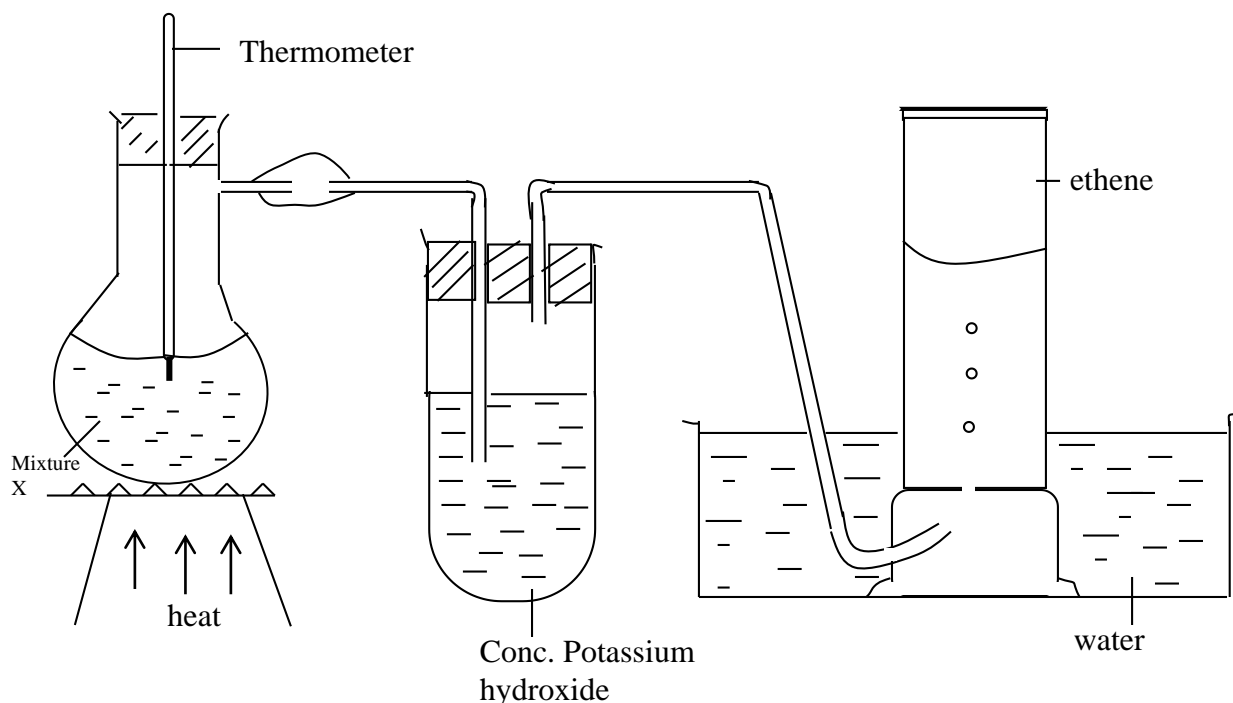


Fig. 1

(a) Name the mixture being heated (1 mark)

(b) Write the equation of reaction (1 mark)

(c) What is the function of the

(i) Concentrated Potassium hydroxide solution?

(½ mark)

(ii) Thermometer

(½ mark)

(d) Ethene was bubbled through a solution of acidified potassium permanganate

(i) State what is observed.

(1 mark)

- (ii) Name one other gas which shows similar behavior like ethene with potassium permanganate. (½ mark)
-

5. 20cm³ of dilute hydrochloric acid reacted completely with Zinc metal and 480cm³ of Hydrogen gas evolved at room temperature.

- (a) Write the equation of reaction (1 ½ marks)
-

(b) Calculate:

- (i) The mass of zinc the reacted (2 marks)
-
-
-
-
-
-
-
-

- (ii) The concentration of the acid in moles per litre. (1 ½ marks)
-
-
-
-

6. The atomic numbers of elements P, Q and R are 2, 9 and 20 respectively.

(a) State the

- (i) Group number of P and Q (1 mark)

P = _____

Q = _____

- (ii) The period of element R (½ mark)
-

(b) Element P is generally unreactive

- (i) Give a reason _____ (½ mark)
- (ii) Name one other element in the periodic table which shows similar behavior like P _____ (½ mark)
- (c) The compound formed when Q combines with R conducts electricity.
- (i) State the condition under which the compound conducts electricity. _____ (½ mark)

- (ii) Explain your answer in C(i) _____ (2 marks)
- _____
- _____
- _____
- _____

7. (a) Define the term rusting _____ (1 mark)
- _____

- (b) Draw a well labeled diagram to show that rusting cannot take place in the absence of oxygen _____ (1 mark)

- (c) Two Iron rods X and Y were connected with a wire to magnesium and Lead metal respectively as shown in figure 2.

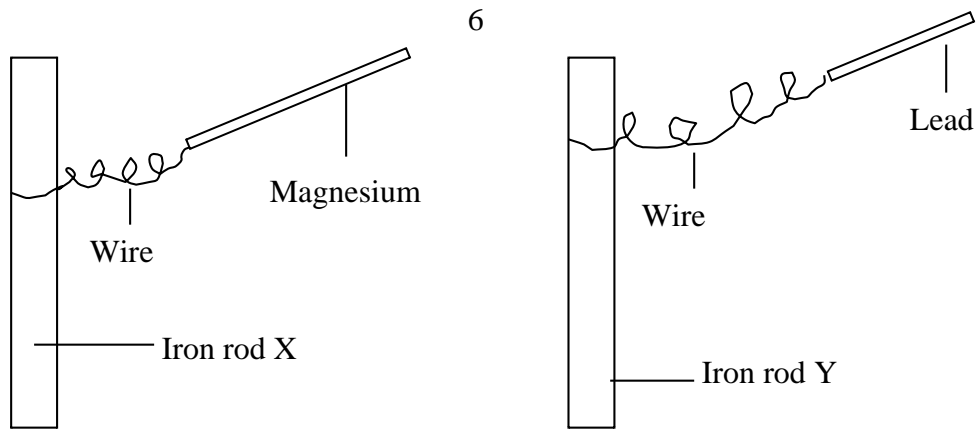


Figure 2

The Iron were left in the open for several months

State what would be observed on

(i) Iron rod X

(1 ½ marks)

Explain your answer

(ii) Iron rod Y

(1 ½ marks)

Explain your answer

8. To aqueous magnesium hydrogen carbonate was added the following:-

(a) Sodium carbonate solution

(i) State what was observed

(½ mark)

(ii) Write the equation for the reaction that took place

(1 ½ marks)

(b) Soap solution.

State what was observed

(½ mark)

-
- (c) Aqueous magnesium hydrogen carbonate was heated.
(i) Write the equation for the reaction that took place (1 ½ marks)

-
- (ii) Soap solution was added to resultant mixture in (c)
State what was observed (½ mark)
-

9. (a) What is a hydrocarbon? (1 mark)

- (b) A gaseous hydrocarbon, W contains 82.8% carbon. Calculate the empirical formula of the hydrocarbon W (2 marks)

- (c) If 1.16gm of the hydrocarbon W occupied 0.448dm³ at s.t.p
(i) Calculate the molecular mass of hydrocarbon W. (1 ½ marks)

- (ii) Determine the molecular formula of W (1 mark)

10. (a)(i) Define the term “alloy” (1 mark)

- (ii) Give a reason why alloys are more useful than pure substances. (1 marks)

- (b) State the composition of the following alloys

- (i) Bronze (1 mark)

- (ii) Solder (1 mark)

- (c) State one use of

- (i) Bronze (½ mark)

- (ii) Solder (½ mark)

SECTION B(30 MARKS)

Attempt only two questions

11. (a) When Sulphur is extracted from the Sulphur beds, Super-heated water is pumped down a shaft into the beds containing sulphur
- (i) Name the process by which Sulphur is extracted. (½ mark)
- (ii) What is meant by Super-heated water? (1 mark)
- (iii) Why does the water have to be super-heated? (1 mark)

- (b) When the molten Sulphur is pumped to the surface, it solidifies
- (i) Name the allotrope of Sulphur which forms first (½ mark)
- (ii) Give a reason for your answer in b(i) (1 mark)
- (c) Write equations only to show how Sulphuric acid is obtained from Sulphur. (6 marks)
- (d) Name the gas produced when each of the following substances is heated with concentrated sulphuric acid
- (i) Sodium Chloride (½ mark)
- (ii) Sodium Chloride and Manganese (IV) oxide (½ mark)
- (iii) Copper (½ mark)
- (e) Explain what is observed when burning magnesium is lowered into a gas jar Sulphur dioxide. (3½ marks)
12. Explain the following observations
- (a) When Zinc powder is added to a solution of Copper (II) Sulphate, the color of the solution turns from blue to colorless and the temperature of the solution rises.
- (b) The pH of a solution of sodium carbonate is greater than 7 whereas the pH of a solution of ammonium chloride is less than 7
- (c) Molten sodium chloride conduct electricity but sodium chloride crystals does not.
- (d) Aqueous hydrogen chloride reacts with magnesium producing hydrogen gas whereas a solution of hydrogen chloride in methyl benzene has no effect on magnesium.
- (e) A mixture of Zinc oxide and Aluminium reacts when heated but there is no reaction when a mixture of Aluminium oxide and Zinc is heated.
13. (a) Explain how nitric acid can be prepared in the laboratory. (No diagram needed) (7 marks)
- (b) Concentrated nitric acid is added to copper in a test tube.
- (i) State what is observed (1 mark)
- (ii) Write the equation for the reaction (1 ½ marks)
- (c) Write equation to show the effect of heat on
- (i) Potassium nitrate (1 ½ marks)
- (ii) Silver nitrate (1 ½ marks)
- (d) Lead (II) nitrate decomposes when heated according to the equation.
- $$2\text{Pb}(\text{NO}_3)_{2(s)} \longrightarrow 2\text{PbO}_{(s)} + 4\text{NO}_{2(g)} + \text{O}_{2(g)}$$
- Calculate the mass of Lead(II) nitrate to be heated to form 1.5 dm³ of nitrogen dioxide gas at s.t.p (molar mass of Pb(NO₃)₂ = 331 gm) (2 ½ marks)

14. (a) (i) What is meant by the term sewage? (1 mark)
(ii) Explain the role of bacteria in sewage treatment. (2 marks)
(iii) State two uses of sewage sludge (2 marks)
- (b)(i) What is water treatment (1 mark)
(ii) Name four water pollutants (4 marks)
(iii) Mention three characteristics of a polluted water (3 marks)
- (c) Describe a test for purity of water (2 marks)

End