

Name:.....Signature:.....Stream:.....

545/2

CHEMISTRY

Paper 2

Jun./July.2022

S.4

2 hours.

THE CHEMISTRY DEPARTMENT

INTERNAL MOCK EXAMINATIONS-2022

CHEMISTRY

Paper 2

2 hours 30 minutes

INSTRUCTIONS:

*Section A consists of 10 structured questions. Answer **all** questions in this section.*

*Answers to these questions **must** be written in the spaces provided.*

*Section B consists of 4 semi-structured questions. Answer any **two** questions from this section. Answers to these questions **must** be written in the answer booklet(s) provided.*

*In both sections **all** working must be clearly shown.*

Where necessary use;

[H=1; C=12; N=14; O=16; Na=23; S=32; Cl=35.5]

1 mole of gas occupies 24l at room temperature

1 mole of gas occupies 22.4 l at s.t.p.

For Teachers' Use Only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A (50 MARKS)

Answer all questions in this section.

1. (a) Classify each of the following naturally occurring substances as an element, compound or mixture.

(i) Petroleum. (01 mark)

.....

(ii) Coal. (01 mark)

.....

(iii) Sand. (01 mark)

.....

(iv) Limestone. (01 mark)

.....

(b) State **one** industrial use of,

(i) Coal. (01 mark)

.....

(ii) Limestone. (01 mark)

.....

(c) A mixture consists of pure copper and zinc in appropriate proportion was strongly heated at high temperatures to molten state ,then allowed to cool, forming substance **W**.

(i) Name **W** (01 mark)

.....

(ii) State **one** use of **W**. (01 mark)

.....

(iii) State **one** advantage of Substance **W** over pure copper (01 mark)

.....

2. (a) Name the substance which, together with manganese(IV) oxide is used in the laboratory preparation of:

(i) Chlorine (01 mark)

.....

(ii) Oxygen ($\frac{1}{2}$ mark)

.....

(b) State the role of manganese(IV) oxide in the reaction for laboratory preparation of:

(i) chlorine ($\frac{1}{2}$ mark)

.....

(ii) Oxygen ($\frac{1}{2}$ mark)

.....

(c) Write equation for the reaction leading to formation of chlorine during its laboratory preparation. (1 $\frac{1}{2}$ marks)

.....

.....

(d) State **one** use of:

(i) chlorine ($\frac{1}{2}$ mark)

.....

(ii) oxygen ($\frac{1}{2}$ mark)

.....

3. (a) Dilute solutions of sodium oxide, potassium chloride and lemon juice were separately tested with litmus. Identify the substance, whose solution;

(i) has no effect on litmus (01 mark)

.....

(ii) turns red litmus paper blue (01 mark)

.....

(iii) turns blue litmus paper red (01 mark)

.....

(b) Distilled water was added to 50 cm³ of 2M phosphoric acid (H₃PO₄) to make 250cm³ of a dilute solution.

Calculate the concentration of hydrogen ions in the dilute solution in mol dm⁻³ (02 marks)

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.....

.....

.....

.....

.....

.....

.....

4. (a) Sodium iodide was added to an aqueous solution of lead(II) nitrate followed by dilute nitric acid .

(i) State what was observed (01 mark)

.....

(ii) Write an ionic equation for the reaction. (1 $\frac{1}{2}$ marks)

.....

.....

(b)(i) State what would be observed if the experiment above was repeated using sodium carbonate solution instead of sodium iodide. (02 marks)

.....

.....

(ii) Give a reason for your answer (01 mark)

.....

5. The table below shows part of the Periodic Table. The letters are not the usual symbols of the elements used.

I	II	III	IV	V	VI	VII	VIII
					L		Y
		M		H			
X	K		J			P	
F	Z						

(a) Give the general name given to the elements belonging to the group of;

(i) X ($\frac{1}{2}$ mark)

.....

(ii) Z ($\frac{1}{2}$ mark)

.....

(iii) P ($\frac{1}{2}$ mark)

.....

(b) Arrange the elements F, K, M, X and Z in order of increasing reactivity. (01 mark)

.....

.....

(c) State whether the compound formed between the following pairs of elements conducts electricity or not.

(i) **J** and **P**.....($\frac{1}{2}$ mark)

(ii) **M** and **L**.....($\frac{1}{2}$ mark)

(d) Name the particles that conduct electricity in;

(i) Element **Z**.....($\frac{1}{2}$ mark)

(ii) Compound formed between **M** and **L** (01 mark)

.....

6. (a) Chlorine was bubbled into aqueous iron(II) chloride.

(i) State what was observed (01 mark)

.....

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

(1 $\frac{1}{2}$ marks)

.....

(b) (i) Name one reagent that can be used to distinguish iron(II) chloride from the product of the reaction in (a)(ii) ($\frac{1}{2}$ mark)

.....

.....

(ii) State what would be observed, if iron(II) chloride and the product of the reaction in (a)(ii) were treated separately with the reagent which you have named in (b)(i). (02 marks)

.....

.....

.....

7. (a) When dilute sodium hydroxide solution is added drop wise to a solution of a sulphate of metal T , a green precipitate is formed which turns brown on standing.

(i) Identify T . ($\frac{1}{2}$ mark)

.....

(ii) Write ionic equation of reaction leading to the formation of the green precipitate. (1 $\frac{1}{2}$ marks)

.....

(b) (i) Write the formula of the brown substance formed. (01 mark)

.....

(ii) Give a reason for the formation of the brown substance. (01 mark)

.....

(c) The brown substance formed in (a) was strongly heated until there was no further change. Write equation of the reaction that took place. (1 $\frac{1}{2}$ marks)

.....

8. A sample of soap can be prepared in the laboratory by boiling a vegetable oil and substance V in a beaker mixed in the ratio of 1: 5 respectively and then adding a saturated solution of sodium chloride to the reaction mixture.

(a) (i) Name V (01 mark)

.....

- (ii) What name is given to the reaction leading to the formation of soap? (01 mark)

.....

- (ii) Write the chemical name of common soap. (01 mark)

.....

- (b) Name **one** crop from which oil for making soap can be obtained. ($\frac{1}{2}$ mark)

.....

- (c) State why a saturated solution of sodium chloride is added to the reaction mixture? (01 mark)

.....

.....

- (d) (i) Give **one** reason why people may prefer using soap over detergents. ($\frac{1}{2}$ mark)

.....

- (ii) State **one** disadvantage of soap over detergents. ($\frac{1}{2}$ mark)

.....

9. Name one reagent that can be used to distinguish between the following pairs of ions and state what would be observed in each case, when each ion was treated separately with the reagent you have named.

- (a) Sulphate ion and chloride ion (2 $\frac{1}{2}$ marks)

Reagent;

.....

Observations;

.....

.....

(b) Aluminium ion and lead(II) ion

(2 $\frac{1}{2}$ marks)

Reagent;

.....

Observations;

.....

.....

10. An aqueous solution of lead (II) nitrate solution was accidentally mixed with a solution of potassium bromide in a test tube by a candidate. A white precipitate **E** was formed and filtered.

(a) (i) Name **E**?

($\frac{1}{2}$ mark)

.....

(ii) Name the type of reaction occurred in the test tube. ($\frac{1}{2}$ mark)

.....

(b) A sample of **E** was electrolyzed.

(i) State the condition needed for this electrolysis to take place.

($\frac{1}{2}$ mark)

.....

.....

(ii) Name the substance used as electrodes?

($\frac{1}{2}$ mark)

.....

(iii) State the possible observation at the anode.

($\frac{1}{2}$ mark)

.....

.....

(c) (i) Write the equation of reaction for the anode reaction.

(1 $\frac{1}{2}$ marks)

.....

.....

(ii) Give an explanation for the reaction taking place at the anode. (01 mark)

.....

.....

.....

.....

SECTION B (30 MARKS)

Answer any two questions from this section.

*Any additional question(s) answered will **not** be marked.*

11. (a) (i) Describe how a dry sample of oxygen gas can be prepared in the laboratory from sodium peroxide. (**No diagram is required but include equation of reaction**). (05 marks)

(ii) State how oxygen gas can be identified in the laboratory. (01 mark)

(b) A burning piece of phosphorus was lowered into a gas jar full of oxygen gas. Write the equation (s) of reaction that took place. (03 marks)

(c) State the conditions and write equation of reaction to show how oxygen gas reacts with iron (03 marks)

(d) Hydrogen gas was passed over strongly heated product formed in (b) (ii)

(i) State what was observed? (1 $\frac{1}{2}$ marks)

(ii) Write the equation of reaction that took place. (1 $\frac{1}{2}$ marks)

12.(a) (i) State what is meant by the term **catalyst**. (01 mark)

(ii) Hydrogen peroxide decomposes when exposed to sunlight. Write equation for the decomposition of hydrogen peroxide. (1 $\frac{1}{2}$ marks)

(iii) Describe a brief experiment by which you can show that manganese(IV) oxide is a catalyst for the decomposition of hydrogen peroxide. (6 $\frac{1}{2}$ marks)

(b) The table below shows the concentrations of hydrogen peroxide that were determined at various time intervals as the decomposition of hydrogen peroxide progressed.

Time(s)	0	400	800	1200	1600	2000	2400
Concentration of peroxide(moldm ⁻³)	0.800	0.580	0.400	0.280	0.200	0.140	0.100

- (i) Plot a graph of concentration of hydrogen peroxide against time. (04 marks)
- (ii) Explain the shape of the graph. (02 marks)

13.(a) During the laboratory preparation of ammonia, ammonium chloride was treated with a powdery solid, **Q**.

Write:

- (i) the name of **Q** ($\frac{1}{2}$ mark)
- (ii) the ionic equation for the reaction that leads to formation of ammonia from **Q** and state the conditions for the reaction. (02 marks)
- (b) Concentrated sulphuric acid, fused calcium chloride and calcium oxide are compounds commonly used as drying agents in the laboratory.
- (i) State which one of the compounds is used as a drying agent for ammonia. ($\frac{1}{2}$ mark)
- (ii) Explain why the other two compounds are not suitable for drying ammonia. (4 $\frac{1}{2}$ marks)
- (c) (i) Write an ionic equation to show the reaction that would take place, if a little ammonia was bubbled through copper(II) nitrate solution. (1 $\frac{1}{2}$ marks)
- (ii) Excess ammonia was bubbled through the resultant mixture in c (i) above. State what was observed. (1 $\frac{1}{2}$ marks)
- (d) Briefly describe how ammonia reacts with air. (4 $\frac{1}{2}$ marks)

14.(a) Sodium is extracted by the Downs process in a cylindrical steel container from its ore to which calcium chloride is added during the

electrolytic process. The electrodes are separated by a cylindrical iron gauze diaphragm.

- (i) Name the sodium ore and state the role of calcium chloride.
(01 mark)
- (ii) State the condition(s) under which the ore is electrolyzed.
($\frac{1}{2}$ mark)
- (b) (i) Name the substance(s) used as the anode and cathode respectively, for electrolysis of the sodium ore. (01 mark)
- (ii) Write equation(s) for the reaction(s) that take(s) place at the cathode. (01 mark)
- (iii) State the purpose of the cylindrical iron gauze diaphragm.
(01mark)
- (c) (i) The sodium produced, is collected under dry nitrogen gas. Give a reason. (01 mark)
- (ii) Name the by-product during the extraction of sodium. ($\frac{1}{2}$ mark)
- (d) State **one** use of;
 - (i) sodium. ($\frac{1}{2}$ mark)
 - (ii) the by-product. ($\frac{1}{2}$ mark)
- (e) When sodium is exposed to air, a white solid developed on the surface.
 - (i) Identify the white solid. ($\frac{1}{2}$ mark)
 - (ii) Write equation(s) only, to show the reaction(s) which lead(s) to the formation of the white solid. (4 $\frac{1}{2}$ marks)
- (f) Write equation for the reaction that would take place, if burning sodium was lowered in a gas jar containing;
 - (i) Oxygen (1 $\frac{1}{2}$ marks)
 - (ii) Hydrogen. (1 $\frac{1}{2}$ marks)

END