

**CHEMISTRY  
FORM 2  
TERM 3 2023**

**MARKING SCHEME**

1. Name a method that can be used to separate each of the following substances.

(3mks)

- a) A mixture of petrol and diesel.

**Fractional distillation**

- b) Kerosene and water.

**Use of a separating funnel**

- c) Food coloring ingredients in a sauce.

**Chromatography**

2. The table below shows the formulae of elements P, Q, R and S (not actual symbols) and their chlorides.

Elements	P	Q	R	S
Formulae of chlorides	PCl	QCl <sub>2</sub>	RCl <sub>3</sub>	SCl <sub>5</sub>

- a) State the group in which element Q belongs.

(1mrk)

**Group II**

- b) Identify one element which is a non-metal.

(1mk)

**Element S**

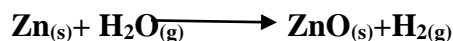
- c) Write down the formulae of P oxide.

(1mk)

## P<sub>2</sub>O

3. Hydrogen can be prepared by passing steam over heated Zinc powder as shown in the diagram below

a) Write down the chemical reaction that produces hydrogen gas. (1mrk)



b) Explain why hydrogen should be burned if not collected over water. (1mrk)

### A mixture of hydrogen and gas explodes.

c) Give another metal that can be used instead of Zinc. (1mrk)

**Magnesium, Iron, Lead or Copper**

4. A piece of sodium metal was placed in a trough half filled with cold water. State the observations that were made.

(3mrks)

- **The metal darts around the water surface.**
- **The metal melts into a silvery ball.**
- **There is production of a hissing sound.**

5. The curves below represents the variation of temperature with time when pure and impure samples of a solid were heated separately.

I. Which curve shows the variation in temperature of the pure solid. Explain (2Mrks)

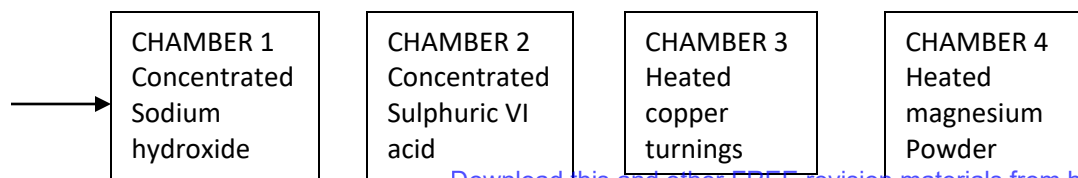
### Q. Constant melting points and boiling points

II. State the effect of impurities in the melting and boiling points of a pure substance. (2Mrks)

a. **Melting point – Lower the melting point.**

b. **Boiling point – Raises the boiling point.**

6. Air was passed through several reagents as shown below;



AIR

=

Escaping

Gasses

a.) Name the main inactive component of air

(1mk)

**Nitrogen gas**

b.) Name the components of air that are removed in the following chambers

i. Chamber 1

**CO<sub>2</sub> gas**

ii. Chamber 3

**O<sub>2</sub> gas**

iii. Chamber 4

**N<sub>2</sub> gas**

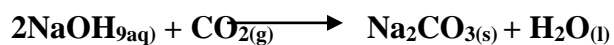
c.) What is the purpose of passing air through concentrated Sulphuric VI acid?

(1mk)

**To remove /absorb water vapor/drying agent**

d.) Write a chemical equation for the reaction which takes place in

i. Chamber 1

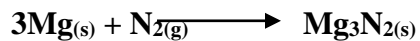


**penalize 1/2 if state symbols**

**are**

**missing/wrong**

ii. Chamber 4



**penalize fully if not balanced**

e.) Explain the observation made in chamber 3 during the reaction.

(2mrks)

**Brown solid changes to black**

**Brown copper metal oxidised form copper II oxide**

f.) Name one gas which escapes from the scheme above. (1mrk)

**Argon**

**Neon**

**Helium**

7.a) Distinguish between hygroscopy and efflorescence. (2mrks)

**Hygroscopy is a process which salts exposed to the atmosphere become damp.**

**Efflorescence is a process by which salts lose water of crystallization to the atmosphere.**

b.) Starting with lead II oxide describe how you would prepare Lead II sulphate (3mrks)

- To a given volume of nitric acid, add excess Lead II oxide until some residue is left in the beaker.
- Filter to obtain Lead II nitrate solution and Lead II oxide residue.
- To the filtrate add excess solution of  $\text{Na}_2\text{SO}_4$  to ensure complete precipitation.
- Filter to obtain  $\text{PbSO}_4$  as residue and  $\text{NaNO}_3$  solution as filtrate.
- Rinse the residue and dry between filter papers.

8.a) Describe a chemical test to differentiate between carbon IV oxide and carbon II oxide gas. (2mrks)

**Pass the two gasses separately through  $\text{Ca}(\text{OH})_2$  solution. White precipitate is observed with Carbon IV oxide while no white ppt is formed with carbon II oxide**

b.) Give 3 uses of carbon IV oxide gas. (3mrks)

- As a refrigerating agent for perishable goods.
- Used as a fire extinguisher.
- Used in manufacture of sodium carbonate in Solvay process.

9. a) Using dots and crosses to represent electrons, draw a diagram to show bonding in Sodium Chloride

(NaCl)

(2mrks)

b.) Both graphite and diamond are allotropes of carbon. Graphite conducts electricity whereas diamond does not. Explain (2mrks)

**The presence of delocalized electrons in the structure of graphite explains its electrical conductivity. Diamond has no delocalized electrons in its structure.**

10. Both ions  $Y^{2-}$  and  $Z^{2+}$  have an electron configuration of 2.8.8

a.) Write the electron arrangement for

(2mrks)

**Y 2.8.6**

**Z 2.8.8.2**

b.) What is the mass number of atom Z given that it has 20 neutrons

(1mrk)

**40 Protons + neutrons = Mass no**

**20+20 = 40**

11. The diagram on the next page shows a set up which was used by a student to investigate the effect of electricity on molten Lead II Bromide.

a.) Explain the observation at the cathode

(2mrks)

**Grey deposits of lead beads are deposited at the cathode**

b.) Why does solid lead II Bromide not allow the passage of electricity

(2mrks)

**Lead II Bromide solid is a molecular substance and does not contain ions which are responsible for electrical conductivity.**

c.) Write equations to show the reactions taking place

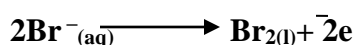
i. At the cathode

(1mrk)



ii. At the anode

(1mrk)



12. Study the set up in the next page and answer the questions that follow

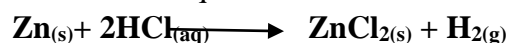
a.) Identify gas X

(1mrk)

**Hydrogen gas**

b.) Write a chemical equation for the reaction liberating gas X

(1mrk)



c.) Why is it not advisable to use calcium in this method of preparing hydrogen?

(2mrks)

**Reaction of calcium with acids is explosive**

d.) Give the use of anhydrous calcium chloride in the U-tube

(1mrk)

**To dry hydrogen gas**

e.) Name another substance that could serve the same purpose as anhydrous calcium chloride (1mrk)

**Conc. Sulphuric VI acid or Calcium Oxide.**

a. Name the method used to collect gas X

(1mrk)

### Upward delivery/downward displacement of air

13. The grid below shows part of the periodic table. Use it to answer the questions that follow.

a.) Which of the elements has the largest atomic radius? Explain

(2mrks)

**Q – Has the highest number of occupied energy levels**

b.) Identify the most reactive metal. Explain

(2mrks)

**Q – Has the largest atomic radius thus valency electrons loosely held**

c.) Name the chemical family to which P and Q belong.

(1mrk)

**Alkali metals**

a.) Compare the atomic radius of S and U. Explain

(2mrks)

**S has large atomic radius than U because U has a higher nuclear charge than S**

b.) Select an element that does not form an ion. Explain

(2mrks)

**V/W**

**It is stable**

c.) Give the formula of one stable cation with an electron arrangement of 2.8.8

(1mrk)

**$Q^{+1}$**

14.a) Define the term isotope

(1mrk)

**Are atoms of the same element with the same atomic number/Number of protons but different mass number.**

b.) Chlorine gas has a mass of 35.5. It is made up of two isotopes  $^{35}_{17}\text{Cl}$  and  $^{37}_{17}\text{Cl}$ . Determine the relative abundance of each isotope in the chlorine gas.

(3mrks)

$$35.5 = \frac{(X \times 35) + (100 - X) \times 37}{100}$$

100

$$100 \times 35.5 = 35x + 3700 - 37x$$

100

$$x = 75$$

$$35.5 = -2x + 3700$$

75% & 25%

$$3550 = -2x + 3700$$

$$2x = 3700$$

-3550

150

$$2x = 150$$

$$\frac{2x}{2} = \frac{150}{2}$$

15. Write a balanced equation for the decomposition of the following solids

(3mrks)



16. Though Sodium and aluminium are in the same period and are both metals, aluminium is a better conductor of electricity. Explain

(2mrks)



**Conductivity increases with increase in the number of delocalized electrons. Aluminium has more electrons than sodium.**

17. List any five uses of oxygen gas`

(5mrks)

- **Used in hospitals by patients with breathing difficulties.**
- **Used by mountain climbers and deep sea divers.**
- **Used to burn fuels.**
- **Used as a reactant in fuel cells.**
- **During steel making, Oxygen is used to remove iron impurities.**







