

## CHEMISTRY FORM 2

### MARKING SCHEME

1. Explain how you would obtain a pure Ammonium chloride from a mixture of Lead sulphate and Ammonium chloride. (3mks)
  - **Place the mixture into a beaker and cover with a watch glass containing cold water.**
  - **Heat the mixture gently. Ammonium chloride will dissociate gently. Ammonium chloride will dissociate into  $\text{NH}_3$  and  $\text{HCl}$  that will recombine to form  $\text{NH}_4\text{Cl}$ .**
2. State and explain the changes in mass that occur when the following are heated separately in open crucibles. Write a chemical equation for each reaction.
  - a) Lead metal. (2mks)
    - **Lead metal will increase in mass because of combines in oxygen from air.**  
$$2\text{Pb}_{(s)} + \text{O}_{2(g)} \longrightarrow 2\text{PbO}_{(s)}$$
  - b) Lead carbonate. (3mks)
    - **Lead carbonate will reduce in mass because of decomposes to lead oxide and carbon(iv) oxide.**  
$$\text{PbCO}_{3(s)} \longrightarrow \text{PbO}_{(s)} + \text{CO}_{2(g)}$$
3. Explain why a mixture of copper (II) oxide and magnesium reacts when heated while there is no reaction when a mixture of copper and magnesium oxide is heated. (3mks)
  - **Mg has a higher affinity for combined oxygen than copper hence removes oxygen from the  $\text{CuO}$ . Cu is below Mg in the reactivity series hence cannot reduce  $\text{MgO}$ .**
4. An element x has an electronic configuration of 2. 8. 5.
  - i) State the period and group which the element belongs. (2mks)
    - **Period 3, group V**
  - ii) Write the formula of the most stable ion formed when element x ionizes. (1mk)
    - **$\text{X}^{3-}$**
  - iii) Explain the difference between the atomic radius of element x and its ionic radius. (2mks)
    - **the ionic radius is larger because of the electron- electron repulsion between the existing electrons and the added electron.**
5. (i) Explain why the metals such as Magnesium and Aluminum are good conductors. (2mks)
  - **They have delocalized electrons**
  - (ii) State two reasons why Aluminum is preferred to Magnesium for Magnesium for making cooking pans. (2mks)
    - **Al has more delocalized electrons than Mg**
    - **Al has a coat of Oxygen**
6. Define the following terms:
  - (i) Atomic Number (1mk)
    - **The number of protons in the nucleus of an atom**
  - (ii) Mass Number (1mk)

**Sum of protons and neutrons in an atom of an element.**

- (iii) The Isotopes (1mk)

**These are atoms of the same element having the same atomic number but different mass number**

- (iv) Ionization energy (1mk)  
**Minimum energy required to remove an electron from the outermost energy level of an atom in the gaseous state.**

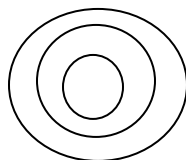
- (v) Electron affinity. (1mk)  
**Refers to the ability of an atom to gain an electron in a gaseous state.**

7. Atoms of element x exist as  ${}^{14}_{66}\text{X}$  and  ${}^{12}_{66}\text{X}$

- (a) What name is given to the two types of atoms. (1mk)

**Isotope**

- (b) Use dot (.) and (x) diagrams to illustrate the atomic structure of x. (2mks)



x

- (c) Write the electron configuration of the atom in (b) hence write the formula of the compound formed when it combines with oxygen (O=8) (2mks)

**X 2.4**  
**X xO<sub>2</sub>**

8. The following table gives a summary of some properties of elements P, Q, R and S. the letters do not represent the actual symbols of the elements. Study the table and answer the question that follows.

element	Electron arrangement	valency
P	2.2	2
Q	2.7	1
R	2.8.2	2
S	2.8.8.2	2

- a) Which two elements have similar chemical properties? Explain. (2mks)  
**P R & S. They have same No. of electrons in their outermost energy level.**
- b) What is the most likely formula of a carbonate of S ? (1mk)

**SCO<sub>3</sub>**

- c) (i) Identify the element which is a non- metal. (1mk)

**Q**

- (ii) With an explanation, state the family and period to which the element in (i) belong. (3mks)

**Halogens, has seven electrons in outermost energy level, period 2 has two occupied energy levels**

9. (a) What is meant by chemical family of elements. (1mk)

**They are elements in the periodic table with the same number of electrons on the outermost energy level that predicts physical and chemical properties.**

- (b) Explain the following observations.

- (i) Atomic radii generally decrease across a period. (2mks)

**There is an increase in the nuclear charge across the period due to an increase in the no. of protons**

- (ii) Melting points increase from sodium to Aluminium in the third period. (2mks)

**Aluminium has a small size, the packing of the atoms is closer than in sodium due to an increased nuclear charge attractions**

- (iii) Sodium is more reactive than magnesium. (2mks)

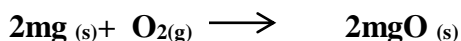
- **Na has low ionization energy than Mg**
- **Na reacts by losing one electron while Mg reacts by two electrons**

- (iv) Chlorine is more reactive than sulphur (2mks)

- **Cl reacts by gaining one electron while sulphur reacts by gaining 2 electrons**
- **Chlorine has a higher electron affinity than sulphur since both are non - metals**

10. Write equations for the following reactions

- a) Burning magnesium in air.

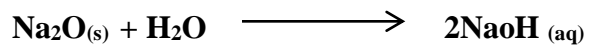


- b) Reaction of

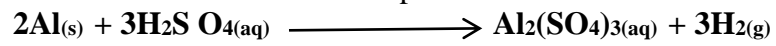
- i) Magnesium with steam



ii) Sodium oxide with water M



iii) Aluminium with dilute sulphuric acid



iv) Sulphur with oxygen

