

NATIONAL UNIVERSITY OF LESOTHO

FACULTY OF EDUCATION

BEP 1313: CHEMISTRY FOR THE PRIMARY TEACHER

TIME: 3 HOURS

MARKS: 100

INSTRUCTIONS

- This paper has **FIVE** questions.
- **Answer any four questions**
- Begin each question from a new page.
- Use pencils for drawing, and pen for labelling.

QUESTION ONE

- a) Define the following terms, and state the examples.
- i. Matter
 - ii. Atom
 - iii. Element
 - iv. Ion
 - v. Molecule
 - vi. Isotope [12]
- b) Matter exists in three states at room temperature and pressure.
- i. Name the three states of matter [1]
 - ii. Describe the arrangement, spacing, movement, and force of attraction in between the three states of matter. [12]

[TOTAL: 25]

QUESTION TWO

- a) Mixtures and compounds are kinds of matter.
- i. State any three differences between a mixture and a compound [3]
 - ii. Using a named example, describe how one would separate a mixture using filtration. The description should include laboratory apparatus, procedure, and the results. [10]
 - iii. State any application of filtration in real life. [2]
- b) Describe water Pollution, its effects, and ways in which it can be prevented. [10]

[TOTAL: 25]

QUESTION THREE

- a) An atom of Calcium has the electronic configuration of 2,8,8,2.
- i. State the group number and the period of Calcium atom [2]
 - ii. The mass number of calcium is 40. State the number of protons, electrons and neutrons in Calcium atom. [3]

- b) An atom of Oxygen has the electronic configuration, 2,6.
- Oxygen can form a bond with Calcium, and with another atom of Oxygen.
Draw dot and cross diagrams to illustrate a bond formed between:
 - Calcium and oxygen [4]
 - Oxygen and oxygen [2]
 - Compare and contrast the **electrical conductivity** and the **melting point** of calcium oxide and oxygen molecules. [4]
- c. Using **metallic bonding**, describe the physical properties of metals such as calcium. [10]
- [TOTAL:25]**

QUESTION FOUR

- State any three physical properties of acids. [3]
- Acids reacts with metals to form salts. State an example of a reaction between a metal and an acid. [2]
- The diagram in Fig. 4.1 shows some of the apparatus used to prepare copper sulphate in the laboratory.

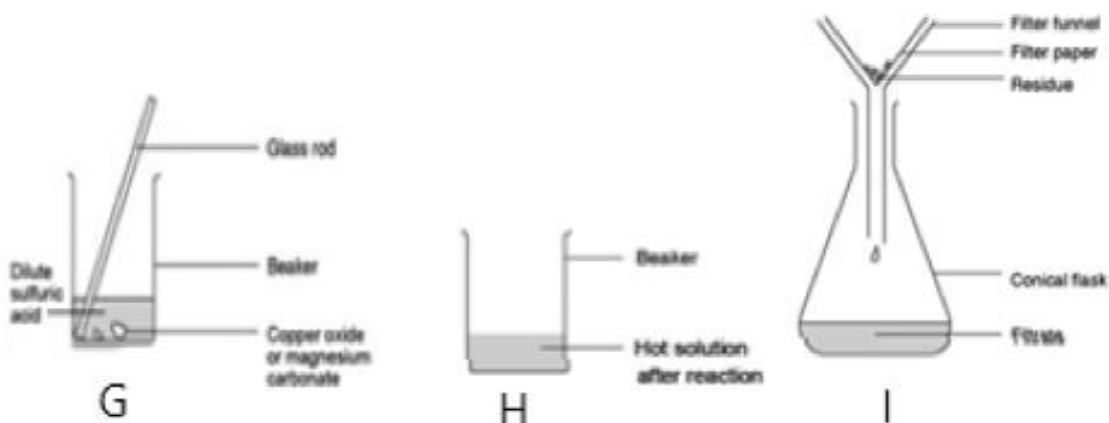


Fig. 4.1

- i. Describe using the apparatus in Fig. 4.1 how pure crystals of copper (II) sulphate can be prepared in the laboratory. [5]
- ii. The formula for Copper (II) Sulphate is $CuSO_4$. Calculate the percentage composition of oxygen in Copper(II) sulphate. [5]
- d) Describe **preparation**, **collection**, and **test** for Oxygen gas in the laboratory. [10]

[TOTAL:25]

QUESTION FIVE

Rubidium, Rb, is a group I element. It has similar physical and chemical properties to the other elements in Group I.

- a) Predict how many electrons there are in the outer shell of rubidium atom [1]
- b) Predict **one** physical property of rubidium which is the same as that of transition elements, such as iron [1]
- c) Predict **two** physical properties of rubidium which are different to those of transition elements such as iron. [2]
- d) When rubidium is added to cold water a reaction occurs.
 - i. Suggest **two** observations that would be made when rubidium is added to water [2]
 - ii. Write a chemical equation for the reaction between rubidium and water [2]
 - iii. Put the Group I elements, caesium, lithium, potassium, rubidium and sodium in order of reactivity with water, starting with the most reactive. [1]
 - iv. Suggest **one** safety measure that should be used when rubidium is added to cold water. [1]
- e) **Table 5.1** shows the properties of Halogens.

Table 5.1

Halogen	Melting point °C	Boiling point °C	Physical state, at r.t.p	Colour
Flourine	-220	-188	Gas	Pale yellow
Chlorine	-107	-35	Gas	Greenish-yellow
Bromine	-7	59	Liquid	Reddish- brown
Iodine	114	184	solid	Black

- i. State the group in which halogens are found? [1]
- ii. State why these elements are called halogens. [2]
- iii. Describe the trend in the physical properties of the Halogens. [8]
- iv. State any four uses of the Halogens [4]

[TOTAL: 25]

The Periodic Table of the Elements

Period	Groups																																																																																																										
	I	II	III	IV	V	VI	VII	0																																																																																																			
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58 Ce Cerium 140.12	59 Pr Praseodymium 140.91	60 Nd Neodymium 144.24	61 Pm Promethium 144.91	62 Sm Samarium 150.36	63 Eu Europium 151.96	64 Gd Gadolinium 157.25	65 Tb Terbium 158.93	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93	68 Er Erbium 167.26	69 Tm Thulium 168.93	70 Yb Ytterbium 173.05	71 Lu Lutetium 174.97
90 Th Thorium 232.04	91 Pa Protactinium 231.04	92 U Uranium 238.03	93 Np Neptunium 237.05	94 Pu Plutonium 244.06	95 Am Americium 243.06	96 Cm Curium 247.07	97 Bk Berkelium 247.07	98 Cf Californium 251.08	99 Es Einsteinium 252.08	100 Fm Fermium 257.10	101 Md Mendelevium 258.10	102 No Nobelium 259.10	103 Lr Lawrencium 260.10

A = relative atomic mass
 X = atomic symbol
 Z = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.)