Uganda Martyrs University

FACULTY OF EDUCATION

BACHELOR OF EDUCATION (PRIMARY) YEAR ONE

SEMESTER ONE EXAMINATIONS, 2022/23

PHYSICAL SCIENCE EDUCATION

PAPER I: STATES OF MATTER, ELEMENTS, COMPOUNDS AND MIXTURES

DATE: 12/01/2022 DURATION: 3 hours. TIME: 9:30am – 12:30pm

Instructions:

- **Do not write anything on this question paper.**
- **Attempt only 4(four) questions of your choice**
- **Begin each selected question on a new page in the answer booklet.**
- **Follow instructions on this question paper and answer booklet carefully.**
- **Each question carries a total of 25 marks**

Question one:

a. i. Define the term matter? **(1 mark)**
   ii. Give at least 5 examples of matter. **(5 marks)**
   iii. Classify the examples in (ii) above using an appropriate criterion. **(5 marks)**

b. Mention the three statements upon which the kinetic theory of matter is based on. **(3 marks)**

c. Describe individually the solid, the liquid and the gas states of matter. **(6 marks)**

Question two:

a. i. Evaporation and Boiling are common phenomena. Identify at least two differences between evaporation and boiling. **(2 marks)**
   ii. What do you understand by the statement, melting and boiling points of a substance depend on the particles in it. **(2 marks)**
   iii. Mention any two uses of the melting and boiling points of a substance. **(2 marks)**
   iv. What are some of the impact of impurities in a substance? **(2 marks)**

b. i. What is an element? **(2 marks)**
   ii. What are some of the common properties of metallic elements? **(3 marks)**
   iii. Define metalloids, giving three examples of them. **(5 marks)**
   iv. What are compounds? **(2 marks)**

Question three:

a. i. Mention any four compounds that exhibit coordinate covalence bonding. **(4 marks)**
   ii. Define a mixture and mention the two categories of mixtures. **(3 marks)**
   iii. What is a phase? **(2 marks)**

b. i. Using your experience about dissolving of substances, suggest some factors likely to influence the process dissolving. **(3 marks)**
   ii. Suggest the reasons as to why some substances dissolve readily while others do not under the same conditions of pressure and temperature. **(3 marks)**

c. i. What is a saturated solution? **(2 marks)**

ii. What are some of the conditions under which a saturated solution can be made more saturated. **(3 marks)**

Question four:

a. The table below shows the variation of the solubility of copper (II) sulphate (in water) with temperature.

Temperature (^{0}C)	0	10	20	30	40	50	60
Solubility (g)/100g of water	14	17	21	24	29	34	40

Plot a graph of solubility against temperature and explain the shape of the graph.

(5 marks)

b. Use the graph in a) above to determine:

i. the solubility of the salt at 15^{0}C. **(2 marks)**

ii. the temperature at which crystals will first appear if the solution contains 37 g of the salt in 100 g of water. **(2 marks)**

iii. the mass of the crystals you will obtain if you cool the solution in (i) to 15^{0}C. **(2 marks)**

c. Briefly describe the filtration method of separating a solid from a liquid. **(3 marks)**

d. i. Briefly describe the solvent extraction method of separating a liquid from a liquid. **(3 marks)**

ii. Name any three types of chromatography. **(3 marks)**

Question five:

a. i. What is meant by solvation? **(2 marks)**

ii. Explain the importance of solvation in the solubility of solutes. **(3 marks)**

iii. What is meant by the term solubility? **(2 marks)**

iv. Why is the solubility of every solute different? **(3 marks)**

b. Explain the following observations:

i. Argon is chemically inert while oxygen is a chemically active substance (despite both substances being gaseous at room temperature). **(5 marks)**

ii. Water is a universal solvent (i.e. it dissolves many solutes) compared to other liquids. **(5 marks)**

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(3 marks)

Question six:

a. The table below shows the structure of several particles

Particle	Electrons	Protons	Neutrons
A	12	12	12
B	12	12	14
C	10	12	12
D	10	8	8
E	9	9	10

i. Which three particles are neutral atoms? **(3 marks)**

ii. Which particle is a negative ion? What is the charge on this ion? **(2 marks)**

iii. Which particle is a positive ion? What is the charge on this ion? **(2 marks)**

iv. Using the table above, identify the particles A to E. **(2 marks)**

b. A mixture of salt and sugar has to be separated using the solvent ethanol.

i. Which of the two substances is soluble in ethanol? **(2 marks)**

ii. Draw a diagram to show how you would separate the salt. **(4 marks)**

iii. How could you obtain sugar crystals from the sugar solution without losing the ethanol in the process? **(2 marks)**

iv. Draw the diagram for the apparatus for **(iii)** above. **(3 marks)**

END