

NAME. \_\_\_\_\_ SIGN \_\_\_\_\_

**CUNCs EXAMINATIONS**  
**END OF TERM II EXAMINATIONS 2025**  
**CHEMISTRY S.5**  
**TIME: 2 HOURS**

**INSTRUCTIONS**

- Attempt all items in this paper

**SECTION A**

**Item1**

The table below shows the melting points of period 3 elements.

ELEMENT	Na	Mg	Al	Si	P	S	Cl	Ar
MELTING POINT(K)	370	923	933	1687	317	388	171	0

(a) Explain why the melting point of Aluminum is greater than that of sodium

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(b) Explain why the melting point of Sulphur is greater than that of Phosphorus.

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(c) Explain the difference in the melting point of Aluminum and Chlorine.

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**Item 2**

Residents of a rural village in Mbale district have raised concerns about the unusual taste and colour of water from the community borehole. Some children have shown signs of developing mental issues and public health officers suspect heavy metal contamination due to nearby informal battery recycling site. As part of the chemistry field investigation, students collected water samples from the nearby boreholes and wells. The samples were analyzed using a mass spectrometer.

Isotope	Isotopic mass	Relative abundance
A	84	0.60
B	86	9.90
C	87	7.0
D	88	82.50

**Task:**

As a learner of chemistry;

- (a) Describe the procedure that was followed during the process of analyzing the data.

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(c ) Explain the two advantage s of the method above.

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**SECTION B**

**Item 3**

A company specializes in producing fuel additives for a camping stove fuel. They are considering using a compound with molecular formula  $C_7H_{16}$  as part of their additive formulation. However, on doing research they found out that the compound has different isomers with different physical properties but similar chemical properties. The company wants to know which isomer would be better for their fuel mixture basing on boiling point. The best fuel additive should be the one that has the highest boiling point. All isomers work for the application but one is more suitable due to its physical and chemical properties.

**Task**

As a learner of chemistry, write a message to;

- (a) Enlighten the company on all different isomers with their respective structural formulae and names.
- (b) Advise and explain to them which isomer would be best suited for their fuel additive formulation.

**Item 4**

You are newly employed to supervise workers at a chemical plant in Namanve industrial park. During weird hours of the night on your first day at work, you found out that substance P was gradually decreasing in mass according below.

$$\frac{-dN}{dt} = \mathbf{KN}$$

- (a) Identify the process taking place above and give a reason for your answer.
- (b) State three particles which are most likely to be released by the substance P above.
- (c) 0.02 moles of P with mass 226 and atomic number 88 was left to decay for  $2.4 \times 10^4$  days. Its half-life was discovered to be 1600 days
  - (i) Calculate the rate constant.
  - (ii) Calculate the number of atoms of P left after  $2.4 \times 10^4$  days.  
(Avogadro's number is  $6.02 \times 10^{23}$  atoms)
- (d) Briefly explain how the method in C (ii) above can be used to determine the age of a dead plant material.
- (e) The data given below is for the decay of P with time

Time(hours)	0	1.0	2.0	5.0	10.0	25	50	75	100
count rate(per hour)	500	268	242	225	204	154	95	55	35

- (i) Plot a graph of count rate against time
- (ii) Determine the rate constant using the graph

**END**