



**JARAMOGI OGINGA ODONGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF HEALTH SCIENCES**  
**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE**  
**PUBLIC HEALTH/COMMUNITY HEALTH AND DEVELOPMENT**  
**1<sup>ST</sup> YEAR 1<sup>ST</sup> SEMESTER 2024/2025 ACADEMIC YEAR**  
**MAIN/KISUMU CAMPUS**

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**COURSE CODE:** HCB 1107  
**COURSE TITLE:** APPLIED CHEMISTRY  
**EXAM VENUE:** STREAM: BSc Public/ Comm. Hlth & Dev  
**DATE:** 10/1/25 **EXAM SESSION:** 15-17.00 HRS  
**TIME:** 2.00 HOURS

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**Instructions:**

- 1. Answer all the questions in Section A and 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**SECTION A [30 MARKS]**

**Answer ALL questions from this Section.**

**Question one.**

a) Define the following terms as used in chemistry. (10 mrks)

- Isotope
- Mass number
- Mole
- Isomers.

b) Define acids and bases according to Bronsted and Lowry theory. (2 marks)

c) A 0.10 M solution of acetic acid ( $\text{CH}_3\text{COOH}$ ) has a pH of 2.87. Calculate the concentration of hydrogen ions ( $[\text{H}^+]$ ) in this solution. (3 marks)

d) 1) Define an electronic configuration. (2 marks)

2) Write the electron configurations and orbital box diagrams of these two elements. (6 marks)

- Chlorine (Cl)
- Magnesium (Mg)

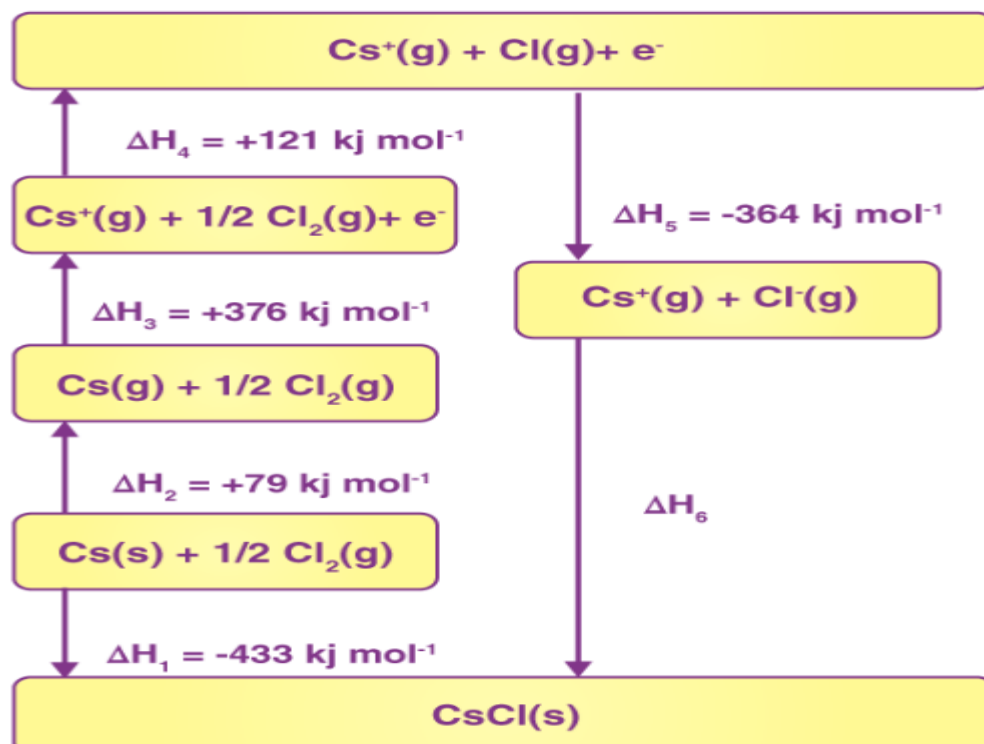
e) Differentiate between non-polar and polar covalent bonds. (4 marks)

f) Explain the below concepts in radioactivity by giving examples: nuclear fission and fusion. (4 marks)

**Question 2**

a) What distinguishes Hess's law from the Born-Haber cycle? (4 marks)

b) The energy level diagram (Born-Haber cycle) for caesium chloride is shown below. Give the names of the enthalpy changes represented by  $\Delta H_1$ ,  $\Delta H_2$ , and  $\Delta H_5$ . (6 marks)



- c) The energy level diagram (Born-Haber cycle) for caesium chloride is shown above. Calculate the value of the lattice energy  $\Delta H_6$ . (4 marks)
- d) Differentiate between transmutation and fission in radioactivity giving examples. (6 marks)

### Question 3

- Define an intermolecular force and describe four categories of the intermolecular forces (10 marks)
- Discuss characteristics of any two types of radioactive decays (natural radiation emitted by unstable nuclei) (10 marks)

### Question 4

- What are the principal differences between nuclear reactions and ordinary chemical changes? (10 marks)
- Discuss ways through which organic compounds can be represented (formulas) (10 marks)

### Question 5

- Describe in terms of bonding structure the following organic functional groups. Alkanes, Alkenes, Alkynes (10 marks)
- What is hybridization of alkenes? (4 marks)
- Give structural formula of an alkane and alkanols (6 marks)