END TERM 3 2026

GRADE 10

CHEMISTRY

TIME: 2 HOURS 30 MINUTES

Name:	_____
Assessment Number:	_____
Class / Stream:	_____
Date:	_____

INSTRUCTIONS TO CANDIDATES

1. Write your name and assessment details in the spaces provided.
2. Read all questions carefully before answering.
3. Answer all questions.
4. Show all working clearly where calculations are required.
5. Draw and label diagrams clearly where required.
6. Give appropriate units in numerical answers.
7. Use the chemical symbols, formulae and equations correctly.
8. Answer all questions in the spaces provided where applicable.
9. Use clear and legible handwriting.
10. Check that all questions and pages are present before submitting the paper.

EXAMINER'S USE ONLY

Section / Questions	Maximum Score	Candidate's Score
A: Questions 1–3	35	
B: Questions 4–6	35	
C: Questions 7–9	30	
TOTAL	100	

SECTION A — PERIODICITY AND CHEMICAL BONDING

1. The elements P, Q and R have atomic numbers 11, 17 and 18 respectively.

(a) Write the electron arrangement of P, Q and R. **(3 marks)**

(b) State the group and period of element Q. **(2 marks)**

(c) Explain why P is more reactive than R. **(2 marks)**

(d) State the type of ion formed by P and write its formula. **(2 marks)**

(e) Explain the trend in atomic size across a period from left to right. **(3 marks)**

2. The table below gives selected properties of four elements. **(12 marks)**

Element	A	B	C	D
Atomic number	3	12	17	18
Period	2	3	3	3
Valency	1	2	1	0

(a) Identify the element most likely to form a stable +2 ion. Give a reason. **(2 marks)**

(b) Write the formula of the compound formed between B and C. **(2 marks)**

(c) State the type of bonding in the compound in (b). **(1 marks)**

(d) Explain how the bonding in the compound in (b) accounts for its electrical conductivity when molten. **(3 marks)**

(e) State one use of a Group I element and one use of a Group VII element. **(2 marks)**

(f) State one physical property that generally changes down Group VII. **(2 marks)**

3. The simplified periodic table below represents selected positions of elements X, Y and Z. **(11 marks)**

[IMAGE GENERATION PROMPT: A clean, crisp black and white simplified periodic table diagram showing three clearly marked positions X, Y and Z. Show periods 2 and 3 and Groups I, II, VII and VIII, with X in Group I Period 3, Y in Group VII Period 3, and Z in Group VIII Period 3. Use solid black outlines, distinct labels, pure white background, zero colour, zero grey fill, zero shading, clean professional Kenyan secondary school examination line-art style.]

(a) State the group and period of X. **(2 marks)**

(b) State the group and period of Y. **(2 marks)**

(c) Which of X and Y has the larger atomic radius? Give a reason. **(2 marks)**

(d) Predict the type of ion formed by Y and explain your answer. **(2 marks)**

(e) State one chemical property that distinguishes Group VII elements from Group VIII elements. **(3 marks)**

SECTION B — ACIDS, BASES AND THEIR APPLICATIONS

4. A learner tested three aqueous solutions A, B and C using indicators. Solution A turned blue litmus red, solution B turned red litmus blue, while solution C produced no change with either litmus paper. **(12 marks)**

(a) Classify A, B and C as acidic, basic or neutral. **(3 marks)**

(b) State the expected pH range for A and B. **(2 marks)**

(c) Explain what is meant by a universal indicator. **(2 marks)**

(d) Give two safety precautions that should be observed when handling concentrated acids or bases in the laboratory. **(2 marks)**

(e) State one household or industrial application of an acid and one application of a base. **(3 marks)**

5. A learner investigated the reaction of dilute hydrochloric acid with three substances: magnesium, sodium carbonate and copper(II) oxide.

(a) Write a balanced chemical equation for the reaction between hydrochloric acid and magnesium. **(3 marks)**

(b) Write a balanced chemical equation for the reaction between hydrochloric acid and sodium carbonate. **(3 marks)**

(c) State the observation when hydrochloric acid reacts with sodium carbonate. **(2 marks)**

(d) Name the type of reaction between hydrochloric acid and copper(II) oxide. **(1 marks)**

(e) Write the balanced equation for the reaction in (d). **(3 marks)**

6. The apparatus below is used to investigate the strength of an acid by measuring its electrical conductivity. **(12 marks)**

[IMAGE GENERATION PROMPT: A clean, crisp black and white educational examination diagram of a simple electrical conductivity setup for comparing aqueous acid solutions. Show a beaker containing solution, two graphite electrodes immersed without touching, connecting wires, a cell/battery and a lamp or suitable indicator in a simple circuit. Clearly label the beaker, solution, electrodes, battery and lamp. Solid black outlines, distinct visible components, pure white background, zero colour, zero grey fill, zero shading, clean professional Kenyan secondary school examination line-art style.]

(a) Name the two electrodes shown. **(2 marks)**

(b) Explain why a strong acid conducts electricity more effectively than a weak acid of similar concentration. **(3 marks)**

(c) State two variables that should be kept constant when comparing the conductivity of the acids. **(2 marks)**

(d) Give one environmental or safety precaution for disposing of acid waste after the experiment. **(2 marks)**

(e) State one reason why electrical conductivity is evidence of the presence of ions in solution. **(3 marks)**

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SECTION C — SALTS AND INTEGRATED APPLICATION

7. A learner is required to prepare dry crystals of copper(II) sulfate from copper(II) oxide and dilute sulfuric acid. **(10 marks)**

(a) State why copper(II) oxide is added in excess. **(2 marks)**

_____

(b) Describe how the excess copper(II) oxide can be removed from the mixture. **(2 marks)**

_____

(c) Explain how copper(II) sulfate crystals can be obtained from the filtrate. **(4 marks)**

_____

(d) State one precaution necessary during the heating/evaporation stage. **(2 marks)**

_____

8. The diagram represents a method of preparing a soluble salt by precipitation. **(10 marks)**

[IMAGE GENERATION PROMPT: A clean, crisp black and white laboratory diagram showing preparation of an insoluble salt by precipitation. Show two labelled aqueous solutions being poured together into a beaker, formation of a precipitate, and a filter funnel containing filter paper over a receiving flask. Include a glass rod where appropriate. Clearly label the two solutions, precipitate, filter paper and filtrate. Solid black outlines, distinct visible edges, pure white background, zero colour, zero grey fill, zero shading, clean professional Kenyan secondary school examination line-art style.]

(a) Define precipitation reaction. **(2 marks)**

_____

(b) State the purpose of filtration in this method. **(2 marks)**

_____

(c) Write a balanced chemical equation for the reaction between aqueous silver nitrate and aqueous sodium chloride. **(3 marks)**

_____

(d) State one way in which laboratory salt waste should be managed to reduce environmental pollution. **(3 marks)**

_____

9. Salts have applications in agriculture, food, medicine, industry and other areas. Some salts may also contribute to environmental problems when used excessively. **(10 marks)**

(a) State two uses of salts in agriculture. **(2 marks)**

_____

(b) Explain one way excessive use of inorganic fertilisers can affect the environment. **(3 marks)**

_____

(c) Distinguish between a soluble and an insoluble salt. **(2 marks)**

_____

(d) A salt sample dissolves completely in water at room temperature. State the observation that would show that the salt is soluble and explain how you would confirm that no solid remains. **(3 marks)**

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END OF QUESTION PAPER