GRADE 10 CHEMISTRY

2026 NOVEMBER – DECEMBER HOLIDAY ASSIGNMENT

Learner's Name: _____	Admission/Assessment Number: _____
School: _____	Date: _____

INSTRUCTIONS TO CANDIDATES

1. Answer all questions in the spaces provided or in your exercise book where more room is required.
2. Read each question carefully and show all working for calculations.
3. Use correct chemical symbols, formulae, units and balanced chemical equations where required.
4. For figure-based questions, study the supplied figure or the indicated illustration carefully before answering.
5. Draw diagrams neatly using a pencil and label them clearly where required.
6. Observe safety precautions when describing or carrying out any practical activity.
7. Where a question asks you to compare, give clear points of comparison.
8. Complete the assignment steadily over the holiday period and check your work before submission.

ASSESSMENT RUBRIC

Strand	Maximum Marks	Marks Scored
Inorganic Chemistry	230	
Physical Chemistry	115	
Integrated Chemistry Task	10	
TOTAL	**355**	

Work carefully, think scientifically and show your reasoning.

SECTION A: INORGANIC CHEMISTRY

This section covers introduction to chemistry, the atom, the periodic table, chemical bonding and periodicity.

QUESTION 1

Chemistry is important in everyday life and in many careers.

(a) Define chemistry. **[2 marks]**

(b) Name four branches or fields of chemistry. **[4 marks]**

(c) For each of the following careers, state one way chemistry is applied: agriculture, medicine, food industry and environmental protection. **[4 marks]**

(d) Explain two ways knowledge of chemistry can help a household make safer choices. **[4 marks]**

QUESTION 2

Study the figure below showing activities that may involve chemical substances.



(a) Identify two activities in the figure in which chemistry is applied. **[2 marks]**

(b) State one benefit of chemistry in each of the two activities you identified. **[2 marks]**

(c) A label on a household product gives dosage, expiry date and safety instructions. Explain why a consumer should read each of these details. **[3 marks]**

QUESTION 3

Safe and responsible use of chemical substances protects people and the environment.

(a) State four responsibilities of a learner when using chemical substances at home or in a laboratory. **[4 marks]**

(b) Explain the difference between a drug's prescribed dosage and substance misuse. **[2 marks]**

(c) Give three possible consequences of misusing drugs or other chemical substances. **[3 marks]**

(d) Suggest three ways learners can sensitise their peers about safe and healthy choices. **[3 marks]**

QUESTION 4

The atom is the basic unit used to describe the structure of an element.

(a) Name the three main subatomic particles and state the charge of each. **[3 marks]**

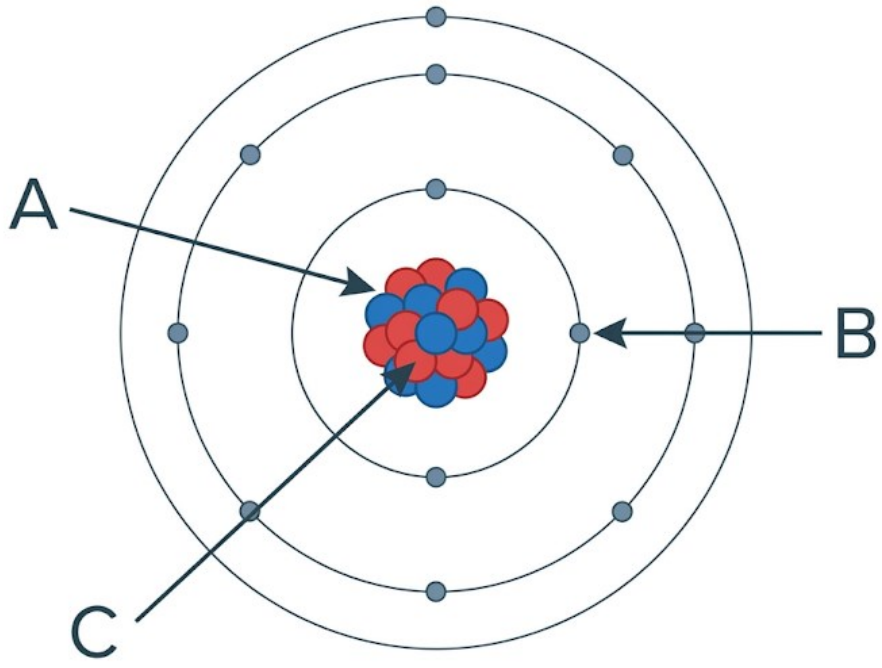
(b) State where the protons, neutrons and electrons are found in an atom. **[3 marks]**

(c) Explain the meaning of atomic number and mass number. **[4 marks]**

(d) An atom has atomic number 13 and mass number 27. Determine the number of protons, neutrons and electrons in a neutral atom. **[3 marks]**

QUESTION 5

The figure below represents a simplified atom. Study it carefully.



(a) Identify the parts marked A, B and C. **[3 marks]**

(b) State the charge of the particle at B. **[1 mark]**

(c) Explain why a neutral atom has no overall electrical charge. **[2 marks]**

(d) State one limitation of a simplified drawing of an atom. **[2 marks]**

QUESTION 6

Isotopes are atoms of the same element that differ in their numbers of neutrons.

(a) Define isotopes. **[2 marks]**

(b) Explain why isotopes of an element have the same chemical properties. **[3 marks]**

(c) Chlorine has two isotopes: chlorine-35 (75%) and chlorine-37 (25%). Calculate its relative atomic mass. **[4 marks]**

(d) State one use or significance of isotopes in science, medicine or industry. **[2 marks]**

QUESTION 7

Electron arrangement helps explain the behaviour of elements.

(a) Write the electron arrangements using s and p notation for carbon (atomic number 6), oxygen (8), sodium (11) and calcium (20). **[4 marks]**

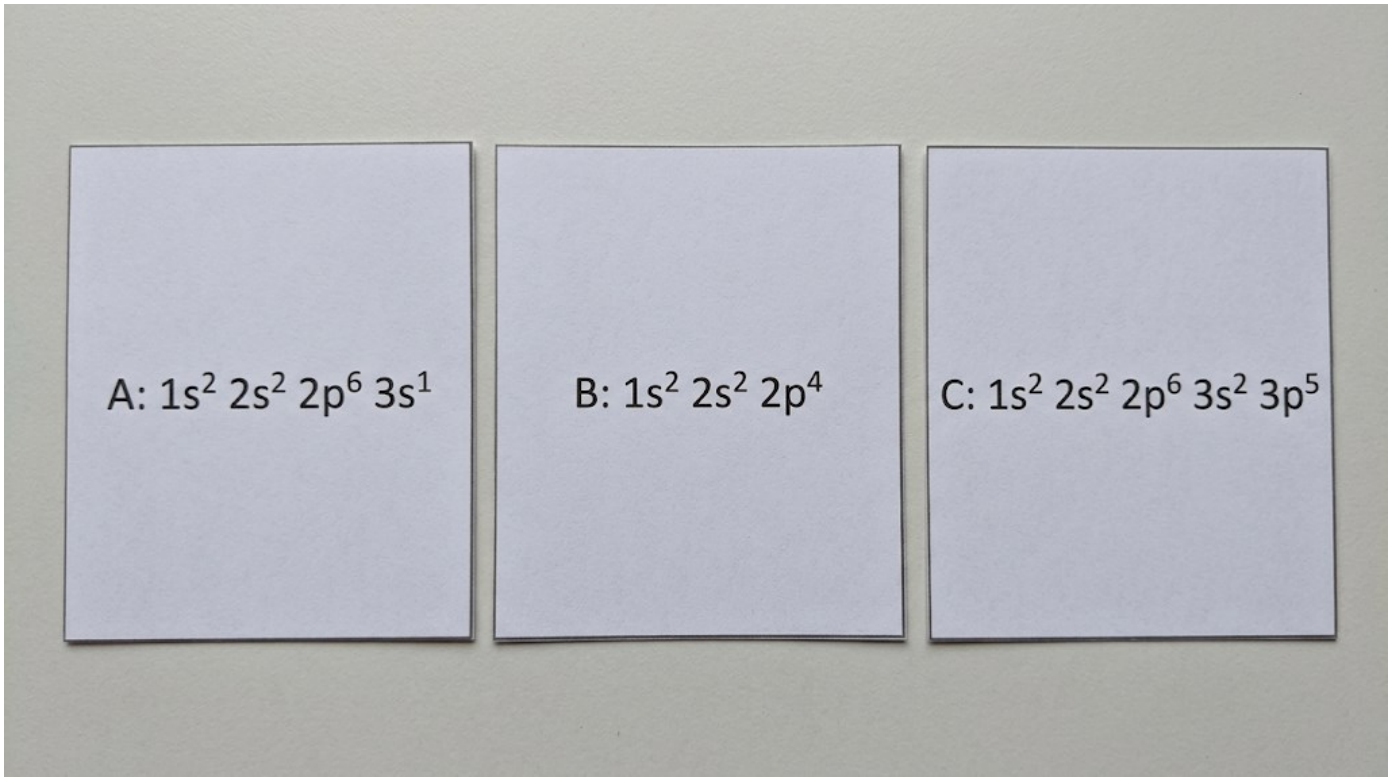
(b) State the maximum number of electrons accommodated in the first energy level. **[1 mark]**

(c) Explain the relationship between energy levels and orbitals in an atom. **[3 marks]**

(d) Describe the order in which electrons fill orbitals in the first 20 elements. **[3 marks]**

QUESTION 8

Study the electron-arrangement cards below.



(a) Identify the element represented by each arrangement: A, B, and C. **[3 marks]**

(b) State the group or chemical family to which each element belongs. **[3 marks]**

(c) Which element is most likely to lose one electron when forming an ion? Explain. **[2 marks]**

QUESTION 9

The periodic table arranges elements in a way that reveals repeating patterns.

(a) Explain the meaning of a group and a period in the periodic table. **[2 marks]**

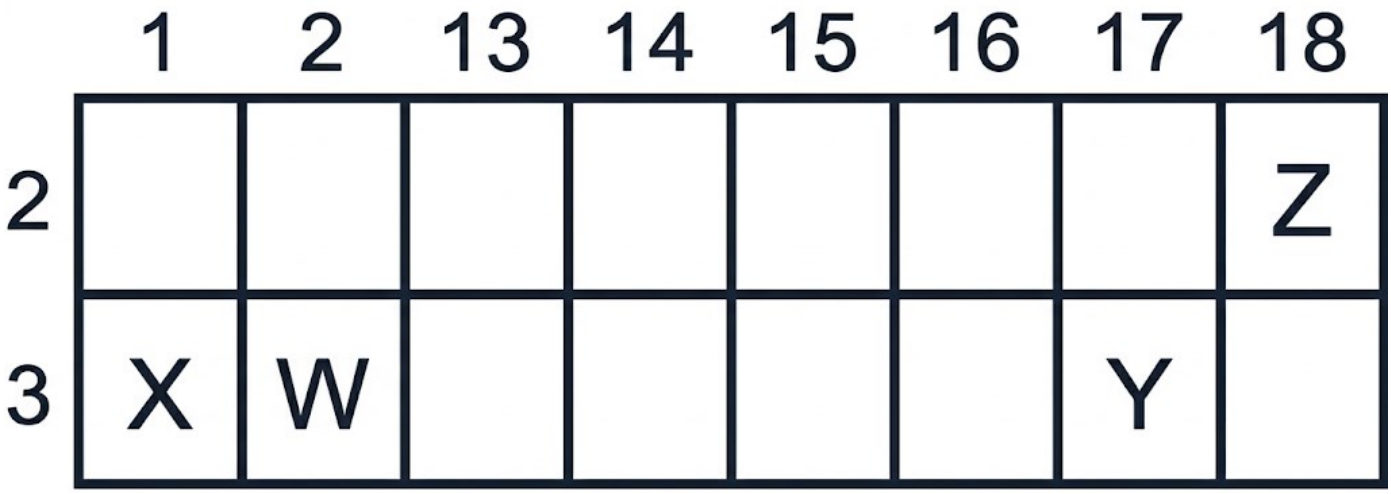
(b) State two ways the periodic table is useful to a chemist. **[2 marks]**

(c) Explain how an element's position in the periodic table is related to its electron arrangement. **[3 marks]**

(d) Distinguish between an alkali metal, a halogen, a noble gas and a transition element. **[4 marks]**

QUESTION 10

Study the simplified section of a periodic table below. The letters are placeholders for elements.



(a) Identify the period and group of element X. **[2 marks]**

(b) Which of the labelled elements is most likely to be a noble gas? Give a reason. **[2 marks]**

(c) Which labelled element is most likely to form a 1+ ion? Explain your answer. **[2 marks]**

(d) Describe one trend in properties that may be observed down a group. **[3 marks]**

QUESTION 11

Ions form when atoms gain or lose electrons.

(a) Define a cation and an anion. **[2 marks]**

(b) Write the symbols, including charges, for the ions formed by sodium, magnesium, oxygen and chlorine. **[4 marks]**

(c) Explain the difference between oxidation number and valency. **[3 marks]**

(d) Determine the oxidation number of sulphur in SO_4^{2-}. **[3 marks]**

QUESTION 12

Chemical formulae and equations communicate information about substances and reactions.

(a) Write the formulae of sodium chloride, magnesium oxide, calcium chloride and aluminium oxide. **[4 marks]**

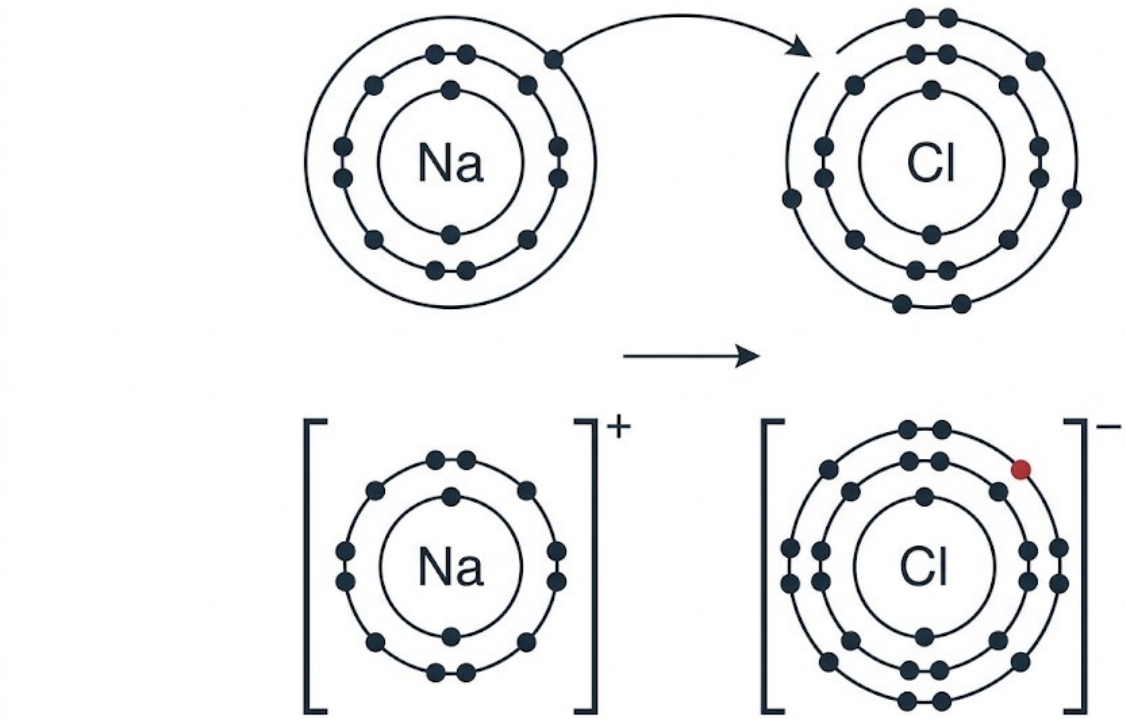
(b) Balance the equations: $H_2 + O_2 \rightarrow H_2O$; $Mg + O_2 \rightarrow MgO$; $Na + Cl_2 \rightarrow NaCl$. **[3 marks]**

(c) Explain why a chemical equation must be balanced. **[2 marks]**

(d) Write a balanced equation for the reaction between magnesium and oxygen. **[2 marks]**

QUESTION 13

The diagram below shows electron transfer during the formation of an ionic compound.



(a) Use the diagram to explain how the ions are formed. **[3 marks]**

(b) Write the formula of the compound formed. **[2 marks]**

(c) State the type of bond formed and explain why it is strong. **[3 marks]**

QUESTION 14

Chemical bonding influences the structure and properties of substances.

(a) Distinguish between ionic bonding and covalent bonding. **[4 marks]**

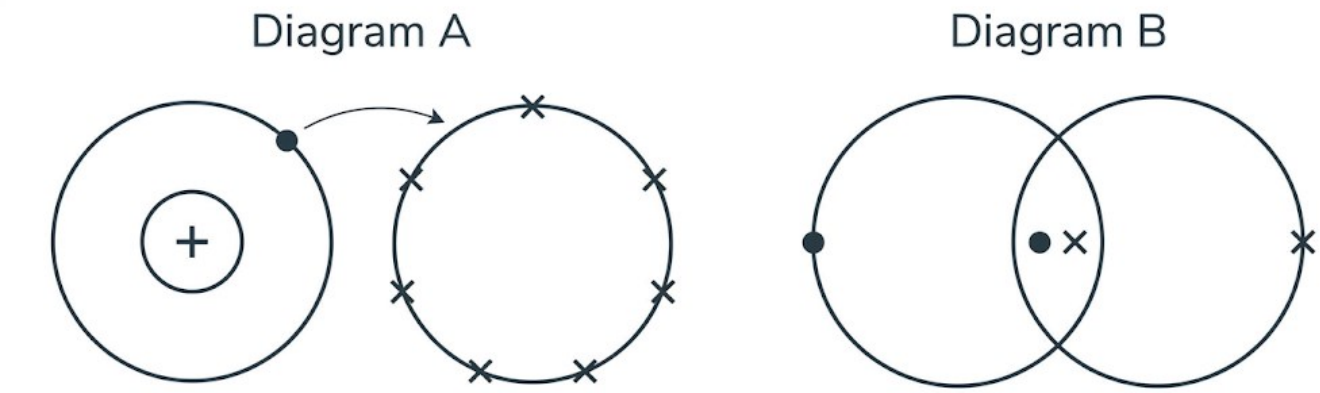
(b) Explain how a covalent bond forms between two non-metal atoms. **[3 marks]**

(c) State the type of bonding present in sodium chloride, water, silicon dioxide and copper. **[4 marks]**

(d) Explain why metals are generally good conductors of electricity. **[3 marks]**

QUESTION 15

Study the dot-and-cross diagrams below.



(a) Identify which diagram represents an ionic bond and which represents a covalent bond. **[2 marks]**

(b) Explain how the electrons are represented in each diagram. **[3 marks]**

(c) Draw a dot-and-cross diagram for a water molecule, showing the outer-shell electrons. **[4 marks]**

QUESTION 16

Substances with different structures have different physical properties.

(a) Compare the melting points and electrical conductivity of a typical ionic compound and a simple molecular substance. **[4 marks]**

(b) Explain why graphite conducts electricity but diamond does not conduct electricity well. **[3 marks]**

(c) State two uses of diamond and two uses of graphite, linking each use to a property. **[4 marks]**

(d) Explain why metals are malleable. **[2 marks]**

QUESTION 17

A learner investigates the properties of four materials labelled P, Q, R and S.

Substance	Appearance	Melting behaviour	Conductivity as a solid	Conductivity when molten or dissolved in water
P	Shiny	Bends when hammered	Conducts	—
Q	Crystalline	High melting point	Does not conduct	Conducts when dissolved
R	Soft	Low melting point	Does not conduct	Does not conduct
S	Dull, brittle	—	Does not conduct	—

(a) From the results shown, identify the material most likely to be a metal. **[2 marks]**

(b) Identify the material most likely to be an ionic compound. **[2 marks]**

(c) Give one reason for each choice. **[2 marks]**

(d) State one precaution when testing electrical conductivity. **[2 marks]**

QUESTION 18

Periodicity refers to repeating patterns in the properties of elements.

(a) Describe two trends in physical properties down Group I. **[4 marks]**

(b) Describe two trends in physical properties down Group VII/17. **[4 marks]**

(c) Explain the trend in reactivity down Group I. **[3 marks]**

(d) Explain why noble gases are generally unreactive. **[2 marks]**

QUESTION 19

The table below gives observations for three elements in the same group.

Element	Position down group	Appearance	Reaction observation	Reaction intensity
A	Top	Pale	Reacts slowly with water, small amount of bubbles	↑
B	Middle	Darker	Reacts steadily with water, visible bubbling and fizzing	↑↑
C	Bottom	Darkest	Reacts violently with water, rapid bubbling and sparks	↑↑↑

(a) Describe the trend in appearance or physical state from the first element to the third. **[2 marks]**

(b) Predict which element is likely to be the most reactive and justify your answer using its position in the group. **[3 marks]**

(c) State one safety precaution when investigating reactive elements. **[2 marks]**

QUESTION 20

Elements in Groups I, II, VII and VIII/18 show characteristic chemical behaviour.

(a) Describe how Group I elements react with water. **[3 marks]**

(b) State the general formula of the oxide formed by a Group II element and explain your answer. **[3 marks]**

(c) Describe the reaction of chlorine with a suitable metal and name the type of compound formed. **[3 marks]**

(d) Explain one reason noble gases are used in situations where a non-reactive gas is needed. **[2 marks]**

QUESTION 21

A learner compares the behaviour of chlorine, bromine and iodine.

(a) State one physical property that can be used to distinguish these three elements. **[2 marks]**

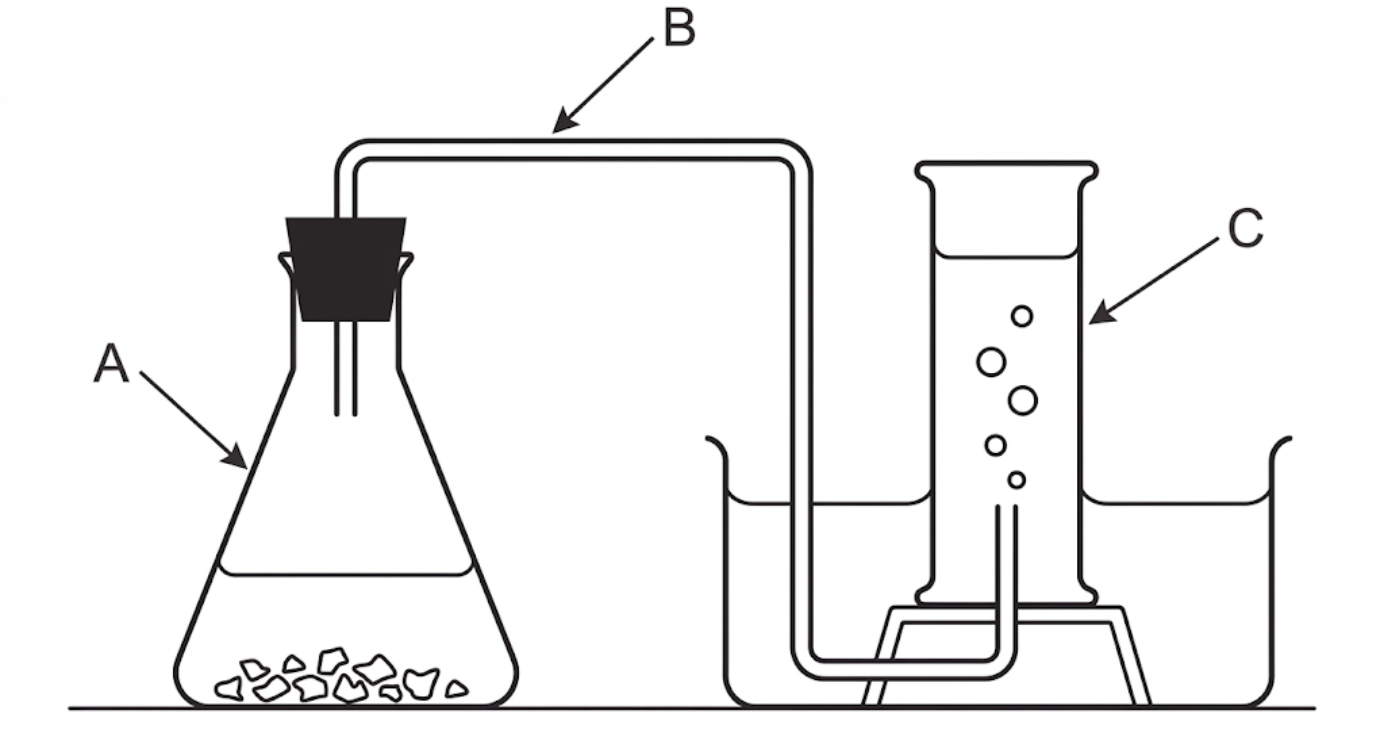
(b) Describe the trend in their physical states at room temperature. **[3 marks]**

(c) Predict which element is most reactive and explain your prediction. **[3 marks]**

(d) State two uses of selected elements from Groups I, II, VII or VIII/18. **[4 marks]**

QUESTION 22

Study the experimental arrangement below for investigating a gas produced during a reaction.



(a) Identify the apparatus marked A, B and C. **[3 marks]**

(b) State one observation that would show a gas is being produced. **[1 mark]**

(c) Explain why the experiment should be carried out in a well-ventilated area when appropriate. **[2 marks]**

(d) State two pieces of information that should be recorded during the investigation. **[2 marks]**

SECTION B: PHYSICAL CHEMISTRY

This section covers acids and bases and introduction to salts.

QUESTION 23

Acids and bases occur in household products and laboratory materials.

(a) State four characteristic properties of acids in aqueous solution. **[4 marks]**

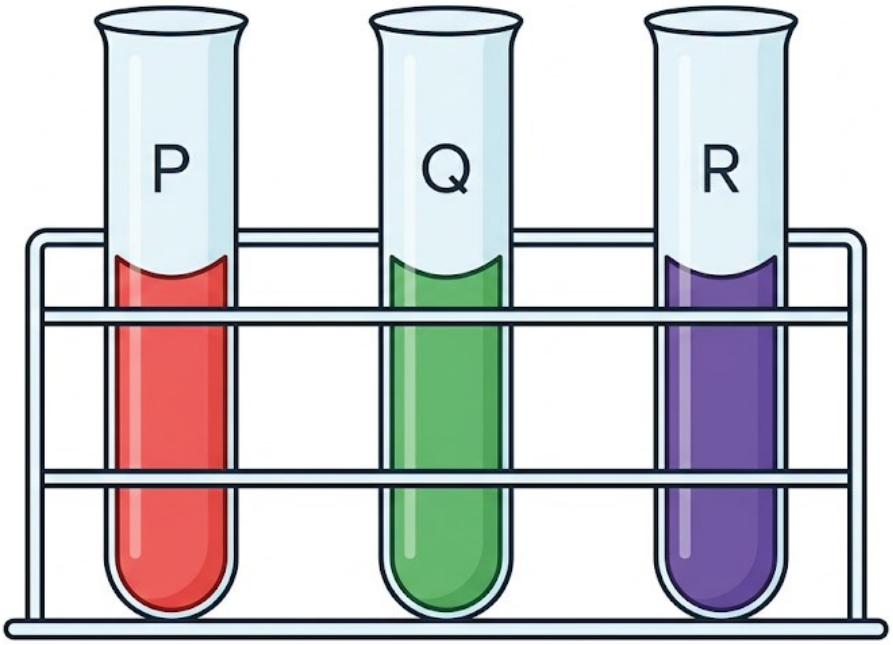
(b) State four characteristic properties of bases in aqueous solution. **[4 marks]**

(c) Give two examples each of acids and bases found in daily life or used in the laboratory. **[4 marks]**

(d) Explain why acids and bases must be handled carefully. **[2 marks]**

QUESTION 24

Study the colour chart for an indicator below.



(a) State the likely pH range of solution P based on the colour shown. **[2 marks]**

(b) Classify solutions P, Q and R as acidic, neutral or alkaline. **[3 marks]**

(c) Explain one advantage of using universal indicator rather than litmus paper. **[2 marks]**

QUESTION 25

The pH scale is used to compare how acidic or alkaline aqueous solutions are.

(a) What is meant by pH? **[2 marks]**

(b) Arrange pH values 2, 5, 7, 9 and 13 from most acidic to most alkaline. **[2 marks]**

(c) Explain the difference between a weak acid and a strong acid. **[3 marks]**

(d) Describe how you would compare the pH of two colourless solutions safely. **[4 marks]**

QUESTION 26

Acids react with some metals, carbonates, hydrogen carbonates, metal oxides and hydroxides.

(a) State the products when a dilute acid reacts with (i) a suitable metal, (ii) a carbonate, and (iii) a metal oxide. **[3 marks]**

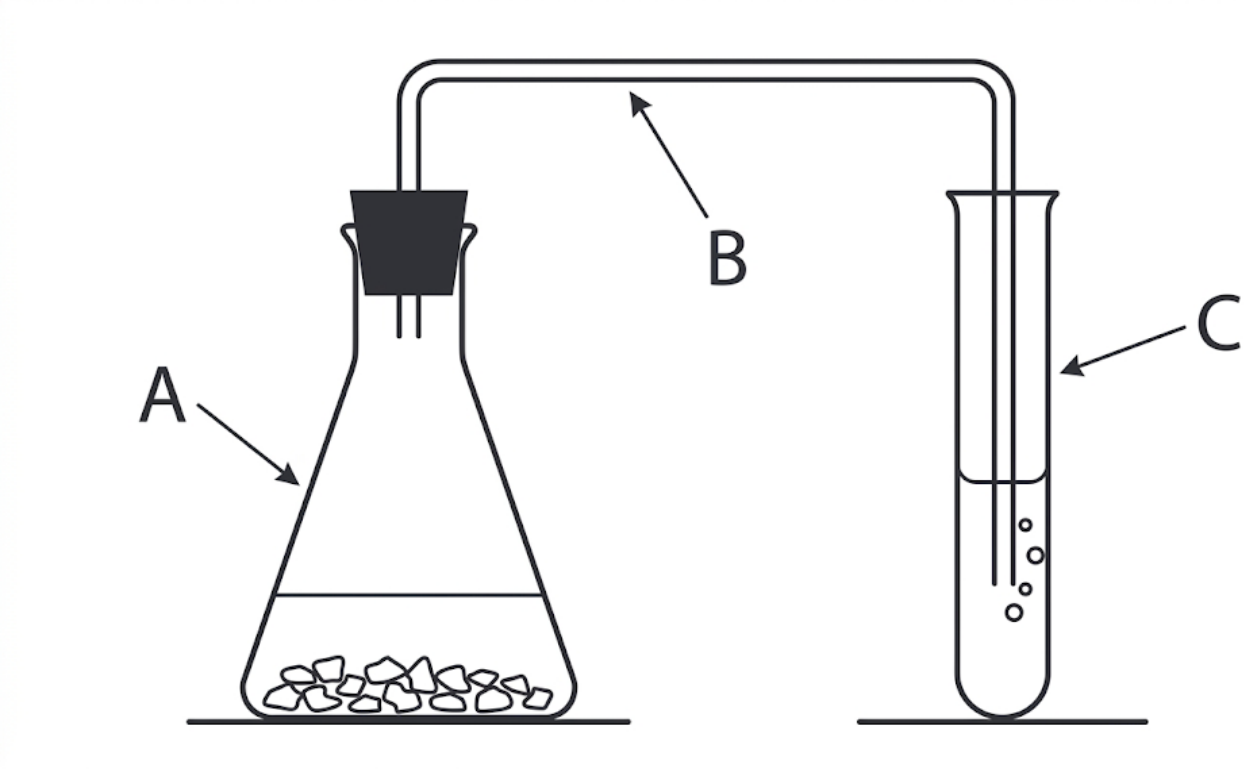
(b) Write a balanced equation for hydrochloric acid reacting with sodium hydroxide. **[2 marks]**

(c) Describe a test for carbon dioxide gas. **[2 marks]**

(d) Explain why the reaction between an acid and a base is called neutralisation. **[2 marks]**

QUESTION 27

The diagram below shows a practical test for a gas produced when an acid reacts with a carbonate.



(a) Name the gas expected to pass through the delivery tube. **[1 mark]**

(b) Describe the expected observation in the test tube containing limewater. **[2 marks]**

(c) Write a word equation for the reaction between an acid and a carbonate. **[3 marks]**

QUESTION 28

Electrical conductivity can be used to compare solutions of acids and bases.

(a) Explain why aqueous solutions of strong acids generally conduct electricity well. **[3 marks]**

(b) State how the conductivity of a weak acid compares with that of a strong acid of the same concentration. **[2 marks]**

(c) Give two safety precautions for an experiment comparing the conductivity of solutions. **[2 marks]**

QUESTION 29

Salts can be prepared by several methods, depending on the solubility of the reactants and products.

(a) Define a salt. **[2 marks]**

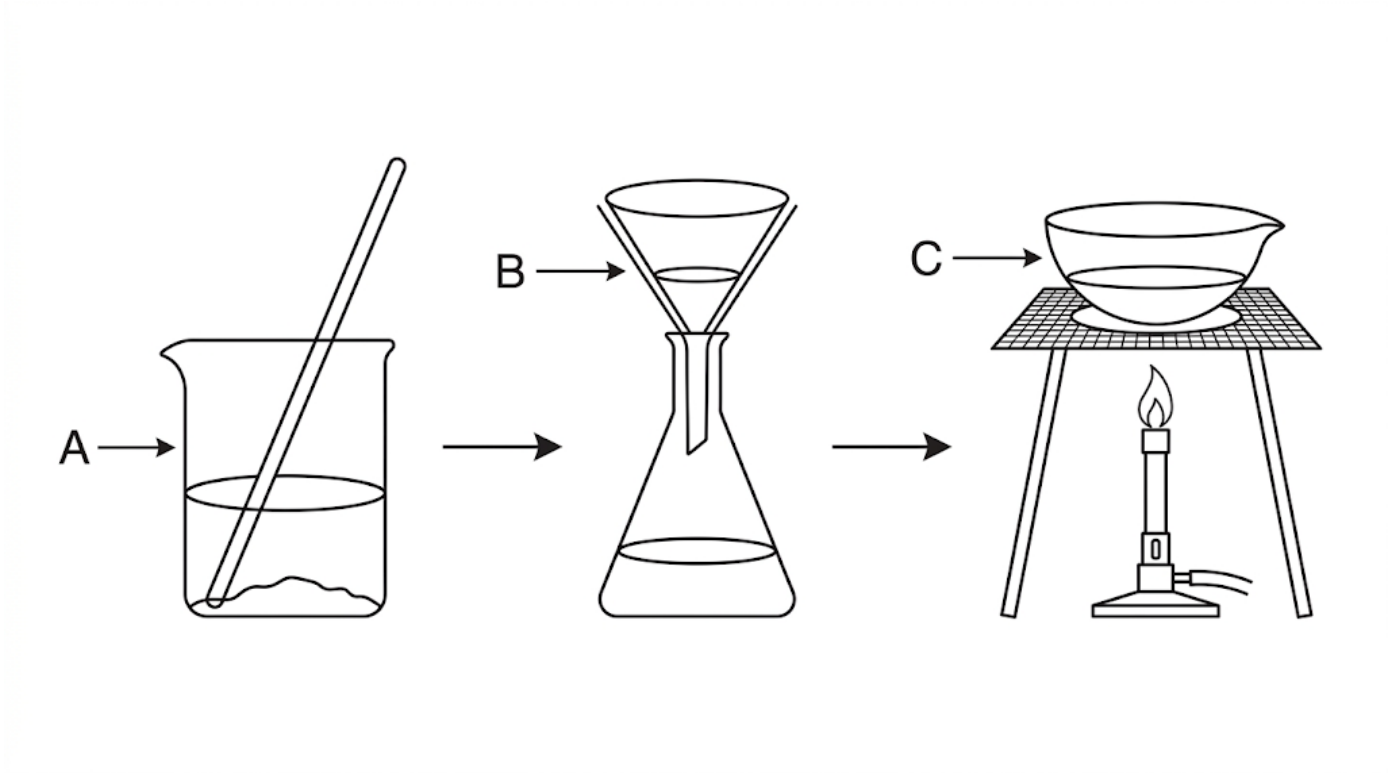
(b) Distinguish between a normal salt, an acidic salt and a basic salt. **[3 marks]**

(c) Describe how to prepare a soluble salt from a suitable insoluble base and a dilute acid. **[5 marks]**

(d) State two ways salts are useful in daily life or industry. **[2 marks]**

QUESTION 30

Study the salt-preparation setup below.



(a) Identify apparatus A, B and C. **[3 marks]**

(b) Explain why the mixture is heated gently during the procedure. **[2 marks]**

(c) Describe how crystals of the salt can be obtained from the solution. **[3 marks]**

QUESTION 31

Solubility affects how salts behave when exposed to water and how they can be prepared.

(a) Explain the difference between a soluble salt and an insoluble salt. **[2 marks]**

(b) Describe how you would investigate the solubility of a salt in water. **[4 marks]**

(c) Explain why some salts are prepared by precipitation rather than by crystallisation from solution. **[3 marks]**

(d) State one environmental concern associated with excessive use of inorganic fertilisers and suggest one mitigation measure. **[3 marks]**

QUESTION 32

Some salts change appearance when exposed to the atmosphere.

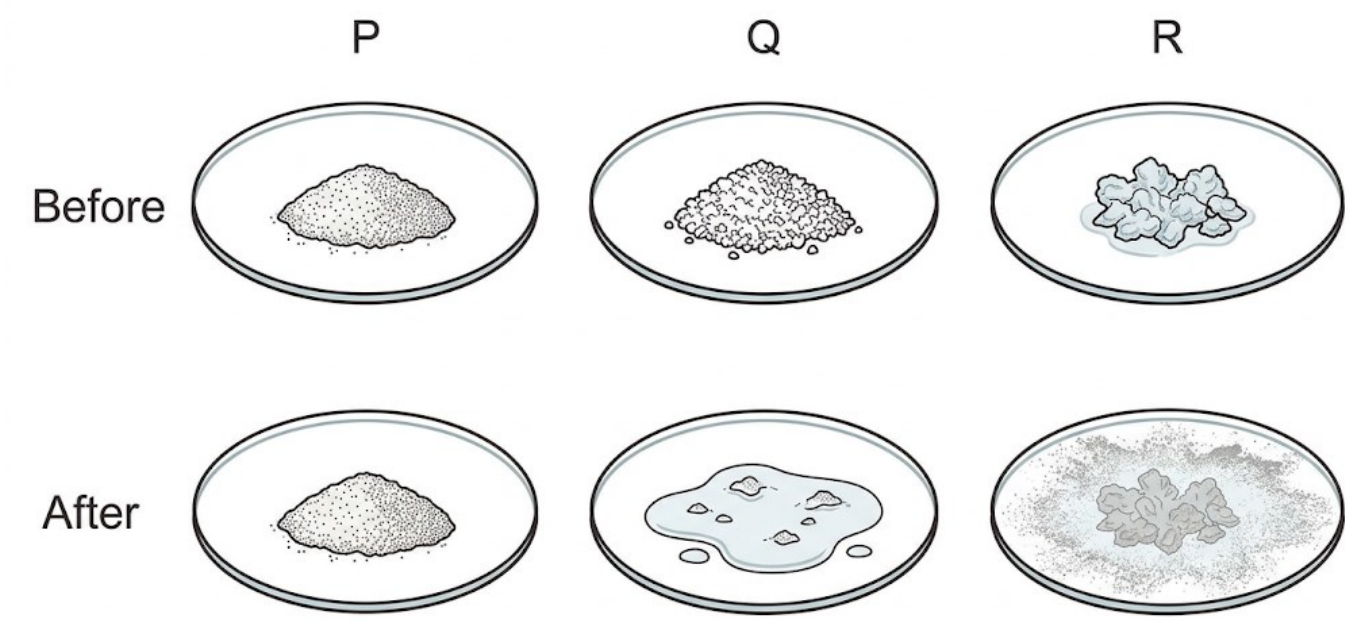
(a) Define hygroscopic, deliquescent and efflorescent salts. **[3 marks]**

(b) Give one observable change that may occur when a deliquescent salt is left exposed to air. **[2 marks]**

(c) Suggest a suitable storage method for salts that absorb moisture from the air, explaining your choice. **[2 marks]**

QUESTION 33

A learner tests three salt samples after leaving them exposed to air.



(a) Identify the sample most likely to be deliquescent from the observations shown. **[2 marks]**

(b) Identify the sample most likely to be efflorescent and give a reason. **[2 marks]**

(c) State one precaution for handling and storing laboratory salts. **[2 marks]**

QUESTION 34

Balanced chemical equations are useful when describing the preparation of salts.

(a) Write a balanced equation for the neutralisation of sulphuric acid by sodium hydroxide to form sodium sulphate and water. **[3 marks]**

(b) Write a balanced ionic equation for the formation of an insoluble salt from aqueous ions of opposite charges. **[3 marks]**

(c) Explain why spectator ions are omitted from a net ionic equation. **[2 marks]**

QUESTION 35

Chemistry knowledge can support informed decisions about consumer products and environmental protection.

(a) Explain why consumers should check ingredient information, expiry dates and safety instructions on manufactured products. **[3 marks]**

(b) Describe two ways inappropriate disposal of laboratory chemicals can harm the environment. **[2 marks]**

(c) Suggest three practices that help make practical chemistry work safer and more environmentally responsible. **[3 marks]**

SECTION C: INTEGRATED CHEMISTRY TASK

Use what you have learnt in this assignment to complete the following application task.

QUESTION 36

A school science club wants to prepare a short safety-and-awareness display for learners about the responsible use of chemistry in daily life.



(a) Choose one everyday chemical product and list the safety information a user should check before use. **[3 marks]**

(b) Explain how the display could communicate the importance of chemistry while discouraging unsafe substance use. **[4 marks]**

(c) Describe how you would check the reliability of information gathered from digital or printed sources. **[3 marks]**