



Candidate Name

Candidate Number

Centre Name

Centre Number

Paper 1:

Sample Paper

(2 hours)

It is necessary to respond on the answer sheets provided alongside this question paper. Additionally, you must have a soft pencil (preferably of type B or HB), a clean eraser and a dark blue or black pen.

INSTRUCTIONS:

- You must write your name, candidate number, centre name and centre number on the answer sheets in the designated spaces.
- Objective section consists of 25 questions, and it is essential that you attempt all of them.
- Each question has four options labelled A, B, C, and D. Select the option that you think is correct. Mark it on the multiple choice answer sheet using a soft pencil.
- Attempt all the questions from subjective section using a dark blue or black pen.
- It is important to follow the instructions provided on the answer sheets.
- Do not use correction fluid.
- Avoid writing on any bar codes.
- You are allowed to use a calculator if needed.

INFORMATION:

- This paper has a total of 100 marks.
- In objective section there are 25 questions, each carries one mark. There is no negative marking for incorrect responses.
- In subjective section, 45 marks are for extended theory and 30 marks for practical component.
- The number of marks assigned for every question or its parts is indicated within brackets [].
- Rough work must be completed on this question paper.

OBJECTIVE SECTION:**[Total 25 marks]**

1. Which of the following is not the correct description for particle arrangement, proximity, and motion of states of matter?

A: Solid particles vibrate and have a fixed regular arrangement.

B: Gas particles are mobile and proximity near to each other.

C: Gas particles have the highest kinetic energy of the three states of matter.

D: Liquids have a fixed volume and an irregular arrangement.

2. Which physical change is occurring when a pure substances particle lose kinetic energy and reform intermolecular bonds between the particles?

A: Condensation

B: Evaporation

C: Freezing

D: Melting

3. Which of the following descriptions does not match evidence for describing Brownian motion?

A: Dust particles moving in air

B: Toothpaste moving randomly in water

C: Ammonia gas moving from a high concentration to low concentration

D: Smoke moving in air

4. Which of the following does not influence the rate of diffusion?

A: Steepness of concentration gradient

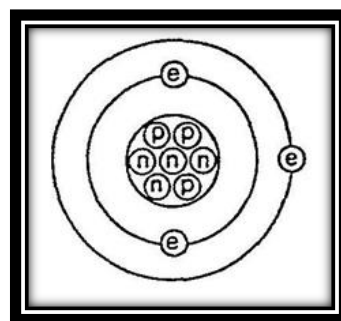
B: Relative molecular mass of substances

C: Temperature

D: Using a catalyst

5. Which method of separation is being observed in the following image?

- A: Filtration
- B: Chromatography
- C: Distillation
- D: Crystallization

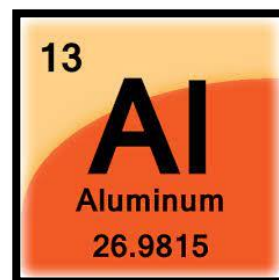


6. Identify the element shown from the following diagram:

- A: Lithium
- B: Argon
- C: Beryllium
- D: Nitrogen

7. Which statement correctly describes an isotope?

- A: Gaining protons
- B: Losing neutrons
- C: Gaining neutrons
- D: Losing protons



8. What is the correct electron configuration for Aluminium?

Simplify to 26 for lower number

- A: 2, 8, 8, 8
- B: 2, 10, 13
- C: 2, 8, 3
- D: 10, 3

9. Which one of the following statements about the below substances are true?

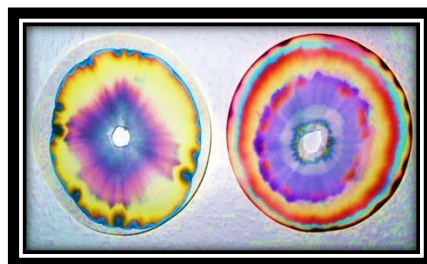
1. Helium exists as a molecule
2. Brass is an example of a mixture
3. Salt water is a mixture
4. Carbon dioxide is a compound
5. Diamond is a pure substance

A: 1, 3, 4 and 5

B: 1, 2 and 5

C: 2, 3, 4 and 5

D: 2, 3 and 4



10. Which of the following statement refers to the correct description of appearance and state of matter of a group 7 element?

A: Pale green solid

B: Pale yellow liquid

C: Purple solid

D: Orangey-brown solid

11. Copper is a metal, a pinkish orange solid, which of the following statements are true about metals?

1. They are sonorous
2. They conduct electricity because ions are free to move.
3. They have delocalised electrons
4. They are brittle
5. They are ductile

A: 1, 2, 3 and 5

B: 1, 3 and 5

C: 2, 3 and 5

D: 2, 3, 4 and 5

12. A newly discovered substance has yet to be classified, from the information below deduce which description is most accurate:

1. High melting point
2. Does not conduct electricity as a solid
3. Does conduct electricity as a liquid

A: Ionic compound

B: Metal

C: Simple covalent compound

D: Giant covalent element

13. Deduce the correct chemical formula for a reaction between element X and Y and if it is covalent or an ionic compound?

X has an electron configuration of 2, 8, and 2

Y has an electron configuration of 2, 5

	Type of bond	Chemical formula
A	Ionic	X_3Y_2
B	Covalent	X_2Y_5
C	Ionic	X_5Y_2
D	Covalent	X_3Y_2

14. Calculate the M_r of ammonium sulfate $(NH_4)_2SO_4$

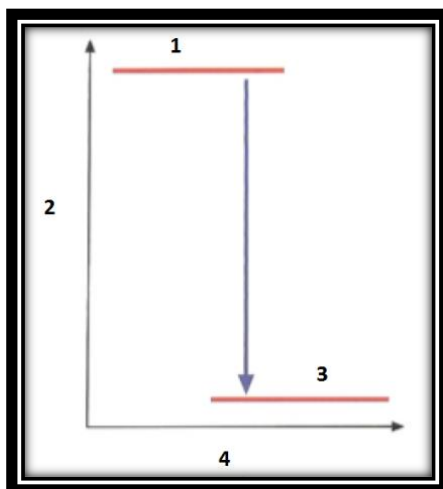
A: 118

B: 132

C: 228

D: 214

15. The energy level diagram below represents a chemical reaction, identify the type of reaction and identify the .. of the diagram.



	Type of reaction	1	2	3	4
A	Exothermic	Reactants	ΔH	Products	Time
B	Endothermic	Products	ΔH	Reactants	Time
C	Endothermic	Products	Time	Reactants	ΔH
D	Exothermic	Reactants	Time	Products	ΔH

16. Which fuel has the energy output per kg?

- A: Coal
- B: Gas
- C: Hydrogen
- D: Uranium

17. Which is the correct definition for an acid and a base?

	Acid	Base
A	Proton acceptor	Proton donator
B	Proton donator	Proton acceptor
C	Electron donator	Electron acceptor
D	Electron acceptor	Electron donator

18. An acidic solution is tested with a range of indicators, which is the correct row?

	Red litmus	Methyl Orange	Phenolphthalein	Universal Indicator
A	Red	Orange	Pink	Orange
B	Red	Yellow	Colourless	Orange
C	Red	Red	Colourless	Yellow
D	Red	Orange	Pink	Red

19. Which of the following is the correct test and observation for the presence of water?

- A: Limewater turning cloudy
- B: Hydrated copper sulphate turning white
- C: Pink cobalt chloride turning blue
- D: Blue cobalt chloride turning pink

20. Three unknown metal samples were tested using the flame test, using the information below identify the 3 metal samples:

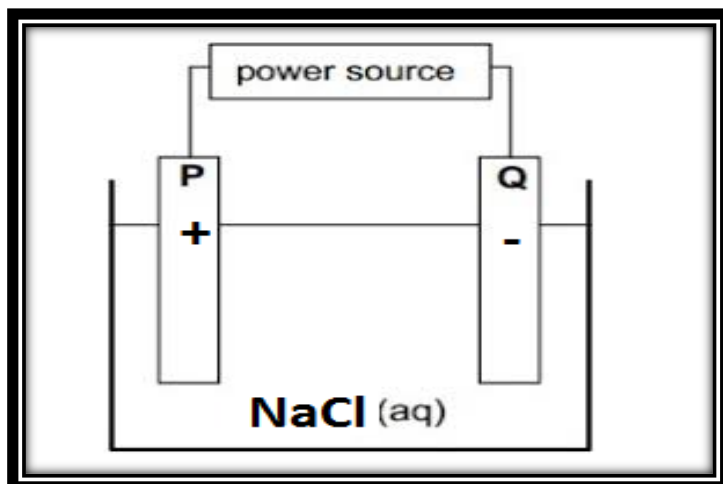
1. Metal 1 produced a yellow flame
2. Metal 2 produced a green flame
3. Metal 3 produced a red flame

	Metal 1	Metal 2	Metal 3
A	Sodium	Barium	Lithium
B	Lithium	Sodium	Potassium
C	Potassium	Copper	Lithium
D	Sodium	Calcium	Lithium

21. Precipitation reactions is another method used to identify cations, an unknown metal nitrate was added to sodium hydroxide and formed a green precipitate. Deduce the correct metal nitrate?

- A: Iron (III) nitrate
- B: Iron (II) nitrate
- C: Aluminium nitrate
- D: Chromium nitrate

22. Electrolysis is used to separate an aqueous solution of sodium chloride. Identify the correct products formed at its electrode.



	P	Q
A	Hydrogen	Chlorine
B	Chlorine	Sodium
C	Chlorine	Hydrogen
D	Hydrogen	Sodium

23. Describe the method of extraction for the following metals and their products?

	Ore	Method of extraction	Product
A	Bauxite	Blast furnace	Aluminium
B	Hematite	Electrolysis	Aluminium
C	Hematite	Blast furnace	Iron
D	Bauxite	Blast furnace	Iron

24. Which of the following statements are disadvantages of recycling metals?

1. Saves valuable raw materials
2. Less economic
3. Difficult to sort metals from each other
4. Requires a lot of organisation
5. More damage to the environment

A: 2, 3 and 4

B: 3 and 4

C: 2, 3 and 5

D: 3, 4 and 5

25. Galvanising is a method used to prevent rusting; iron is coated with zinc. Which statement best describes why galvanising iron prevents rusting?

A: Zinc is below iron in reactivity protecting the iron atoms from water and oxygen.

B: Zinc is more reactive than iron and it prevents the reduction of iron.

C: Zinc is unreactive protecting the iron atoms from water and oxygen.

D: Zinc reacts with oxygen forming a layer of zinc oxide which prevents rusting.

EXTENDED THEORY:**[Total 45 marks]**

Q1) Draw molecular diagrams of the following substances include a suitable key for subatomic structures.

- a) An isotope of a hydrogen atom with an Ar of 3 [1 mark]
- b) A molecule of ammonium ion. [2 mark]
- c) A molecule of aluminium chloride [2 mark]

[Total 5 marks]

Q2) Noble gases are inert and unreactive; they are monatomic with a full outer shell of electrons. Argon is a noble gas and can be used to create an inert atmosphere for industrial processes that produce a high temperature and light bulbs.

- a) Using Avogadro's constant 6.02×10^{23} calculates the number of particles present in 2.7g of Argon? [2 marks]
- b) Name one other noble gas and its use? [1 mark]
- c) Describe the general trend of two physical properties as you go down group VIII? [2 marks]

[Total 5 marks]

Q3) Group 1 metals are also referred to as the alkali metals as they produce an alkali solution after a reaction with water. (Grey-scaled but clear a violent reaction)

- a) Using your knowledge write the balanced chemical equation for potassium being added to water. Including state symbols [3 marks]
- b) Using your answer from part a) deduce the balanced ionic equation. Including state symbols [1 mark]
- c) Describe a suitable test to identify the gas given off and describe a positive outcome? [2]
- d) Using your knowledge of reactivity of group 1 metals, describe and explain the observation of added Caesium. [3 marks]
- e) Due to the reactivity of group 1 metals suggest how they should be stored? [1 mark]
- f) Calculate the mass of oxygen in 10g of lithium oxide. [2 marks]

[Total 12 marks]

Q4) Students have placed 12.35g of copper carbonate in a crucible and heated it with a Bunsen burner with a blue flame this resulted in a gas carbon dioxide being given off.

- a) State the name of the chemical reaction occurring? [1 mark]
- b) Write the balanced chemical equation for this reaction? [2 marks]
- c) Calculate the mass of carbon dioxide released in this reaction. [3 marks]

The students continued to heat until no further gas was given off, they then left the product of the reaction to cool down.

Students then added zinc powder and mixed it with the products of the reaction in part:

- a) before heating again under the blue flame.
- b) Describe and explain the observations the students would have observed in this reaction? [3 marks]

[Total 9 marks]

Q5) a) Oxides are compounds of metals or non-metals with oxygen. Differences between the different types of oxides can be determined by their typical chemical reactions.

i. Complete the table below: [2 marks]

Type of oxide	Named example	Chemical formula
Acidic	NO ₂	
	N ₂ O	
Amphoteric	Zinc oxide	
	Barium oxide	

ii. Describe what is meant by the term amphoteric? [1 mark]

b) Some metal oxide ores can be purified by the process of electrolysis. A similar process can be used for the process of electroplating.

i) What is meant by term electroplating and describe the process? [2 marks]

ii) State two main reasons for electroplating? [1 mark]

iii). Metals are known as conductors of electricity, explain why metals can conduct electricity? [1 mark]

iv). Steel-cored aluminium wires are used in overhead power cables, both are conductors. Suggest another reason for using steel in power cables other than conductivity? [2 marks]

Rubber, plastic, and ceramic are poor conductors of electricity and heat.

iv) What is the correct scientific name given to these type materials? [1 mark]

v) Graphite and diamond are both made of the non-metal element carbon, using your knowledge describe and explain the conductivity properties of both substances. [4 marks]

[Total 14 marks]

PRACTICAL COMPONENT:**[Total 30 marks]**

Q1) Razeal is looking to make solid copper sulphate crystals. He has copper oxide and sulphuric acid available and other general laboratory equipment.

Describe the suitable method in which he can produce solid copper sulphate?

[Total 6 marks]

Q2a) Students are looking at identifying if an unknown substance Z is a pure substance, students will investigate the melting and boiling point of a substance. The students placed the unknown substance in a boiling tube measuring the temperature at 1-minute intervals.

- i) Name the piece of equipment labelled X and its unit? [1 mark]
- ii) Name a piece of equipment missing from the diagram? [1 mark]
- iii) Suggest a reason for having the boiling tube in water, rather than heated directly by the Bunsen flame? [1 mark]

2b) The student recorded the initial temperature and started the timer, for 15 minutes.

19, 20, 22, 23, 26, 28, 30, Y, 30, 30, 35, 38, 43, 45, 50, 50

- i) Draw a suitable table and add the students results? [2 marks]
- ii) Predict the value of Y? [1]
- iii) Draw a suitable line graph for the student data? [4 marks]
- iv) What observation would you expect to see at values 30 and 50? [2 marks]
- v) The students concluded that substance Z was a pure substance, what evidence support this conclusion? [1 mark]

[Total 13 marks]

Q3) Rochelle is provided with a range of solid materials labelled A to E using her Chemistry knowledge she will carry out a range of experiments to assist her come to conclusions.

a) Draw a simple circuit diagram to represent this practical? [1 mark]

b) Identify the dependent variable in this investigation? [1 mark]

Rochelle's results are below:

	A	B	C	D	E
Observation	Light on		Light off	Light off	Light on

Rochelle notes the colours of the substances:

	A	B	C	D	E
Observation	Dark grey	White solid	Purple solid	Dark grey	Yellow solid

c) Substance E has yellow appearance, suggest what substance E could have been? [1 mark]

Rochelle decides to add remaining substances to water and leave them for 3 days and record the results.

	A	B	C	D
Observation	Turned Brownish red solution	White solid	No – change dark grey	Disappeared and formed a purple solution

d) Rochelle believes A to be Iron, describe and explain a test could she carry out to confirm this hypothesis? [2 marks]

e) Substance C was identified as potassium permanganate, explain the chemical nature of C, and explain reasons for the observation? [2 marks]

Rochelle then decides to add the remaining substances to acid and record the results:

	B	D
Observation	Fizzing occurred and gas given off until it disappeared.	No reaction

f) Deduce the gas given off by substance B and the chemical test used to identify the gas? [2 marks]

The product solution of this reaction Rochelle added magnesium powder, and stirred, after some time small deposits of a pinky orange solid formed.

g) Deduce substance B? [1 mark]

h) Deduce substance D? [1 mark]

[Total 11 marks]