SECTION A: MULTIPLE CHOICE QUESTIONS

Five possible answers **A, B, C, D, E** are given for each of the twenty-five questions in this section. Choose the ONE you consider to be best. Each question in this section is worth one mark, for a total of 24 marks.

1 A molecule of benzene contains 6 atoms of carbon and 6 atoms of hydrogen. Its empirical formula is therefore:

A C_6H_6
B C_3H_3
C CH
D $(CH)_6$
E impossible to decide.

2 The term *iodide* is used in preference to *iodine* when:

A iodine is in the free form.
B iodine is mixed with salt.
C iodine has been sublimed.
D iodine is used as an antiseptic.
E iodine is combined with another element.

3 Chromatography is particularly useful for:

A separating small amounts of complex mixtures.
B separating large amounts of complex mixtures.
C separating solids from liquids.
D separating volatile liquids with different boiling points.
E separating mixtures of insoluble solids.

4 Which one of the following terms applies most closely to the statement: "Nitric acid is corrosive".

A Physical property
B Chemical change
C Chemical property
D Physical change
E Compound

5 A chemist would classify ice as:

A a homogeneous mixture.
B a heterogeneous mixture.
C a compound.
D an element.
E none of the above.

6 Which one of the following is *not* a heterogeneous mixture

A salt and sand
B conch salad
C olive oil
D a pride of lions
E paper

7 The diatomic gases H_2, O_2 and N_2 are considered to be

A elements
B compounds
C atoms
D mixtures
E alloys

8 When a drop of bromine is placed in the bottom of a gas jar, the colour of the vapour gradually spreads throughout the jar. This process is known as:

A Atomisation
B Brownian Motion
C Decrepitation
D Diffusion
E Infiltration

9 Most of the mass of an atom is occupied by the,

A nucleus
B protons
C neutrons
D electrons
E ions

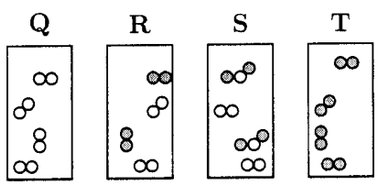
10 Element X is a group II metal in period 3. What would the electron configuration of this element be?

A 2,8,1
B 2,8,2
C 2,8,8,2
D 2,8,3
E 2,3

11 A suitable method for obtaining pure water from salt water is

A precipitation
B reverse osmosis
C centrifuging
D filtering
E evaporation

12 The diagram below shows a variety of ways in which two different atoms can combine.



Choose the diagram(s) Q, R, S, T which best describes a mixture of elements.

A Q only
B both R and S
C both Q and T
D R only
E T only

13 Which one of the following is most likely to involve a chemical change (chemical reaction)?

A A certain mineral was heated. It changed from white to yellow. When it cooled it returned to its original white colour.
B A white powder was shaken with water. A colourless liquid was formed.
C A green solid was heated. It turned black. A gas was evolved which turned limewater milky.
D A cold solid quickly vapourized as a white smoke when dropped into boiling water.
E Part of a liquid was cooled. A solid formed which sank in the liquid.

14 A single covalent bond between two atoms involves

A one electron
B two electrons
C three electrons
D four electrons
E no electrons

15 The following elements are part of the periodic table. Which of the following statements is correct?

Li	Be	B	C	N	O	F	Ne

A These elements are in period 1 of the periodic table.
B These elements are in period 2 of the periodic table.
C The valency of these elements increase in steps of 1 as you move across them from left to right.
D These are the alkaline-earth metals.
E These elements are in group 2 of the periodic table.

16 Oxygen gas may be identified by its ability:

A To relight a glowing splint.
B To turn limewater milky.
C To turn red litmus paper blue.
D To form a white smoke with nitrogen gas.
E To extinguish a lighted splint.

17 Which of the following properties most likely indicates an ionically bonded compound?

A solid, with a high melting point
B colorless liquid
C boils at $-61\,^{\circ}C$
D nonconducting aqueous solution
E reacts slowly in water.

18 The following table, gives the melting point (m.p.) and boiling point (b.p.) of different substances at 1 atm:

substance	m.p./°C	b.p./°C
U	−186	−56
V	269	1265
W	80	123
X	−2	15
Y	0	100
Z	−20	60

Which substance(s) in the table are solid(s) at room temperature (25 °C)?

A U only

B both X and Y.

C both V and W.

D Z only.

E None of these substances are solid at 25 °C.

19 An experiment was carried out to determine the size of a molecule of oil. A solution of the oil in ethoxyethane was dropped on to the surface of some water in a petri dish. Ethoxyethane was used as the solvent for the oil because it:

A sinks in water to leave the oil behind.

B does not mix with the oil too thoroughly.

C is brightly coloured so that it can be seen on the surface.

D evaporates very easily to leave the oil behind.

E can be dropped onto the surface from a teat pipette more easily than most liquids.

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20 Which of the following statements is *not* correct regarding the formation of an ionic bond between magnesium and oxygen?

A Valence electrons are transferred from a magnesium atom to an oxygen atom.

B The properties of magnesium and magnesium oxide are similar.

C Energy is released in the formation of magnesium oxide.

D The mass of magnesium oxide formed is greater than the mass of magnesium used.

E Magnesium oxide contains no molecules.

21 Which of the following statements is *not* true of molecules in the gaseous state according to the kinetic theory of gases?

A Molecules show rapid, random motion.

B Attractions between molecules is negligible.

C Molecules of different gases have the same average kinetic energy at the same temperature.

D Molecules move in straight-line paths between collisions.

E All the molecules in a gas move at the same speed.

22 The pH of a solution of sodium hydroxide would most likely be about:

A 7

B 13

C 6.5

D 1

E 0

23 Which one of the following is a unit of pressure?

A mmHg

B atm

C Pa

D $\mathrm{N\,m^{-2}}$

E all of these

24 A desiccator is a piece of apparatus used to,

A store blue crystals.

B grind things up into small particles.

C keep things dry.

D dry out wet things.

E heat things strongly.

SECTION B: SHORT ANSWER QUESTIONS

Answer ***EACH OF THE FOLLOWING FIVE QUESTIONS*** in the space provided on your question paper. *This section is worth 61 marks.* In numerical questions, indicate clearly how you arrive at your answers.

1 (a) Write the chemical formula for each of the following substances: (4 MARKS)

i.) iron(III) chloride .....

ii.) potassium nitrate .....

iii.) calcium hydrogencarbonate .....

iv.) aluminium sulphate .....

(b) Write the name of each of the following: (4 MARKS)

i.) Na_2O .....

ii.) $CuSO_4$ .....

iii.) NH_4Cl .....

iv.) PbO_2 .....

(c) Write balanced chemical equations in each of the following cases: (4 MARKS)

i.) $B + O_2 \longrightarrow B_2O_3$

.....

ii.) Reactants: H_2SO_4 and NaOH ;
Products: Na_2SO_4 and H_2O

.....

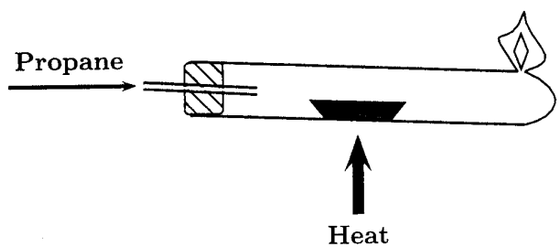
iii.) Reactant: $Pb(NO_3)_2$;
Products: PbO and NO_2 and O_2

.....

iv.) The combustion of hydrogen gas in air.

.....

2 Two samples of copper(II) oxide, **A** and **B**, were prepared by two different methods. Sample **A** was prepared by heating solid copper(II) carbonate. Sample **B** was prepared by heating solid copper(II) nitrate. Both samples were reduced to copper by heating in a stream of propane gas as shown in the diagram below, and the results were used to find the percentage composition of each sample.



(a) How can you tell when the heated sample of copper(II) oxide in the porcelain boat has been reduced to copper? (1 MARK)

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(b) After the reduction of the copper(II) oxide was complete why was the copper cooled in an atmosphere of propane rather than air? (1 MARK)

.....

(c) The table below shows the results of the analysis of the two samples of copper(II) oxide:

	A	**B**
mass of combustion boat	2.60g	2.80g
mass of combustion boat + copper(II) oxide	3.75g	4.24g
mass of copper(II) oxide	——	——
mass of combustion boat + copper	3.52g	3.95g
mass of copper	——	——
mass of oxygen	——	——

i.) Fill in the blanks in the table. (3 MARKS)

ii.) Use the results to calculate the percentage of copper in each sample: (2 MARKS)

Sample A **Sample B**

(d) i.) State and name the law that this experiment helps to support? (2 MARKS)

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.....

3 $25cm^3$ of hydrogen gas were collected at a pressure of 740 mmHg and a temperature of $-13\,°C$.

(a) If the pressure doubled to 1480 mmHg what would its new volume be if the temperature remained at $-13\,°C$? (2 MARKS)

(b) If the temperature doubled what would the new volume be if the pressure remained constant? (2 MARKS)

(c) If the temperature doubled what would the new pressure be if the volume remained constant? (2 MARKS)

(d) What would the volume of the hydrogen gas be at STP? (2 MARKS)

4 (a) Complete the following table with reference to the periodic table. (7 MARKS)

Name of Element	${}^{A}_{Z}X^{charge}$	Mass number	No. of Protons	No. of Neutrons	No. of Electrons	Elec Con
		32	16		18	
			2	2		
Sodium	${}^{23}_{11}Na$					

(b) i.) Define the term isotope in terms of the atomic number and mass number of the atoms of an element.(2 MARKS)

.....

.....

ii.) In terms of electrons, protons and neutrons, what is the difference between the isotopes of an element?. (1 MARK)

.....

(c) i.) Explain the meaning of the term isoelectronic. (1 MARK)

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.....

ii.) Choose from the list below those atoms or ions which are isoelectronic with each other. ${}^{40}_{19}K^{+}$ ${}^{16}_{8}O^{2-}$ ${}^{20}_{10}Ne$ ${}^{40}_{18}Ar$ ${}^{23}_{11}Na^{+}$ ${}^{35}_{17}Cl^{-}$ (2 MARKS)

5 Define each of the following terms using a named example of each. (8 MARKS)

(a) Acid:

.....

.....

.....

(b) Base:

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.....

.....

(c) Indicator:

.....

.....

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(d) Neutralization:

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.....

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6 The following table outlines some of the different methods of preparing salts.

Reaction	Method of Preparation	Example of salt prepared
A	Alkali and acid	sodium sulphate
B	Metal and acid	magnesium chloride
C	Insoluble carbonate and acid	zinc(II) nitrate

(a) For each of the reactions in the table, name two substances which can be used to prepare the salt according to the method given. (i.e. for Reaction A choose an alkali and an acid which can used to prepare the salt sodium sulphate) (6 MARKS)

Reaction	Two substances used in the preparation of salt
A	..... and .....
B	..... and .....
C	..... and .....

(b) For reaction A, the same two substances used to prepare sodium sulphate may have resulted in a different (acid) salt. Name this salt and give its chemical formula.
(2 MARKS)

.....

(c) i.) Write the balanced chemical equation for reaction B including all physical states. (1.5 MARKS)

Reaction	Balanced chemical equation
B	.....

ii.) Write the balanced net ionic equation for this reaction, including all physical states. (1.5 MARKS)

Reaction	Net ionic equation
B	.....

'END OF EXAMINATION'