Section A: ***Multiple Choice*** (Nos. 1-4, 1-mark each)

MARKING GUIDELINES

Use the multiple choice answer sheet in the ANSWER BOOKLET

1. A suitable catalyst for the synthesis of ammonia is:

(A) platinum
(B) iron
(C) concentrated H_2SO_4
(D) nitric acid

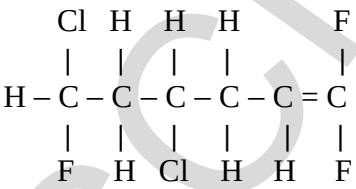
2. A dry precipitate of $Mg(NH_4)PO_4.6H_2O$ was obtained and weighed . It was found to weigh 6.47 g. How much of this precipitate is phosphorus?

(A) 0.82 g
(B) 1.46 g
(C) 0.03 g
(D) 1.64 g

3. Damage to the Earth's stratospheric ozone has mainly been due to a certain group of compounds. Which of the compounds given below is an example of this group of compounds?

(A) $CClF_3$
(B) CCl_2FH
(C) CF_2I_2
(D) CF_3H

4. Which of the following **IUPAC** names is correct for the compound given below?



(A) 1,1,6-trifluoro-4,6-dichlorohexane
(B) 4,6-dichloro-1,1,6-trifluoro-2-hexene
(C) 1,1,6-trifluoro-4,6-dichlorohexene
(D) 4,6-dichloro-1,1,6-trifluoro-1-hexene

Answer Booklet for Sections A and B **Student No.....*Possible Answer*.**

INSTRUCTIONS

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

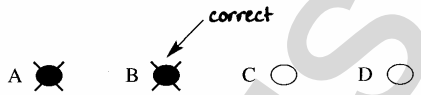
Sample: 2 + 4 = (A) 2 (B) 6 (C) 8 (D) 9

A ○ B ● C ○ D ○

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ● B ⊗ C ○ D ○

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word **correct** and drawing an arrow as follows.



Section A

Multiple Choice Answer Sheet

					Outcomes
1.	A O	B **I**	C O	D O	**H7**
2.	A **I**	B O	C O	D O	**H7**
3.	A **I**	B O	C O	D O	**H7, H8, H9,H16**
4.	A O	B O	C O	D **I**	**H13**

Section B.

5. Describe a chemical test and the result to identify

Outcomes:H7,H13

(a) copper ions .....

Criteria	Mark
Add NaOH solution to form a blue precipitate, then NH_3 solution to form a deep blue solution	***1***

(b) lead ions

Criteria	Mark
*Add KI solution to form a yellow precipitate **or** add KCl solution to form a white precipitate soluble in hot water.*	***1***

(c) calcium ions

Criteria	Mark
Add $Na_2C_2O_4$ solution to form a white precipitate or NaF solution to form a white precipitate.	***1***

6. A student investigated the sulfate content of a fertiliser. Firstly, he dissolved 3.2 g of fertiliser in distilled water. Then, he added barium chloride solution until no further precipitate formed. He, then filtered, washed, dried and weighed the precipitate.

Outcomes:H10, H11, H13

(a) Write a net ionic equation for the formation of the precipitate. **1**

Criteria	Mark(s)
$Ba^{2+} + SO_4^{2-} \rightarrow BaSO_4(s)$	**1**

(b) If the student recovered 5.6 g of barium sulfate. What percentage of this fertiliser is sulfate ions? **2**

$$mol\ BaSO_4 = \frac{mass}{mm} = \frac{5.6}{137.3 + 32.06 + 4(16.00)}$$

mol $BaSO_4$ = 0.02399 » 0.024 = mol SO_4^{2-}

*mass SO_4^{2-} = mol SO_4^{2-} x molar mass SO_4^{2-} = 0.024 x 96.06 = **2.3 g***

*%SO_4^{2-} = (mass SO_4^{2-} / mass fertilizer) x 100% = **72%***

(c) If the student assumed the original fertiliser consists of ammonium sulfate only, what is the percentage of nitrogen in the fertiliser? **2**

$(NH_4)_2SO_4 \rightarrow 2NH_4^+ + SO_4^{2-}$

\ moles NH_4^+ = 2 x moles SO_4^{2-}

mols NH_4^+ - 2 x 0.024 = 0.048 = moles N

% N = ((moles N x At. No. N)/mass fertilizer) x 100%

$$= \frac{0.048 x 14.01}{3.2} x\ 100\% = \mathbf{21\%}$$

OUTCOMES: H15

7. (a) List three different chemical occupations

Criteria	Mark
Any of the following or other reasonable types*: polymer, organic, physical, analytical, environmental, industrial, cereal, etc.*	**1**

(b) (i) Choose one of these occupations and outline the role of the chemist.**,**

OUTCOMES:H13

Criteria	Mark(s)
Any appropriate answer, for example: *An analytical chemist in a pharmaceutical company may monitor the acetylsalicylic acid content of tablets or preparations*	**1**

(ii) Explain a chemical principle used by this chemist.

OUTCOMES :H13

Criteria	Mark(s)
Any reasonable answer for example: *The chemist may be using colorimetric methods to quantitate the aspirin, in which case, the aspirin is hydrolysed, allowed to react with* Fe^{3+} *and the colour that develops is measured in a colorimeter. The principle behind this is Beer's law or the fact that the extent of absorption of light depends on the number of particles absorbing the the light and hence for a given volume of solution, depends on the concentration.*	**1**

8.. Identify the origins of minerals in oceans. **H8**

Criteria	Mark(s)
1 mark for each identified source	
Minerals may come from runofffs as water percolates through soil, dissolving minerals on the way to the ocean	**1**
Hydrothermal vents in midocean ridges is a conduit for hot water (heated up by molten magma) allowing it to percolate through rocks, dissolving minerals and at the same time allowing the diffusion of the dissolved minerals to the greater bulk of ocean water	**1b**

9. (a) Use equations to show the destruction of ozone in the stratosphere by a CFC.

OUTCOMES: H16,H7

Criteria	Mark(s)
$CCl_3F + \text{uv light} \rightarrow Cl + CCl_2F$	**1**
$Cl + O_3 \rightarrow ClO + O_2$	**1**
$ClO + O \rightarrow O_2 + Cl$	**1**

(b) Explain the importance of the ozone layer to life on Earth.

OUTCOMES: H16, H7, H9

Criteria	Mark(s)
Because of its ability to initate bond breakage and bond formation in substances such DNA of the cell, UV rays damage, alter or even kill organisms in various ways. The ozone layer filters off most of these harmful UV rays, protecting the life forms on Earth.	**1**

10. Describe two methods which you would use, including details of the preparation which you would do to determine the dissolved solids content of a sample of river water.

. **OUTCOMES: H13,H14, H11**

Criteria	Marks
Each method explained earns 1 mark while preparations for the analysis such as filtering and cleaning the electrodes earn 1 mark	
In the evaporation method, the water is first filtered, then weighed and evaporated to dryness in a weighed container. The residue, completely devoid of water is weighed and the mass of the container subtracted to get the mass of the residue. The concentration in the original sample is calculated by dividing the mass of the residue with the mass of the water . *In the conductivity technique, the electrodes of the conductivity meter are immersed in the water sample and the reading taken. Readings obtained are in ppm. The liquid being measured should freely come into contact with the electrodes of the meter.*	**3**

11. (a) Draw the Lewis electron dot structures for the oxygen molecule and the oxygen free radical.

OUTCOMES: H13, H7,H6

oxygen molecule	oxygen free radical

Criteria	Mark(s)
Corrrect structures	**1**

(b) On the basis of molecular structure and bonding, explain the difference in:

(i) chemical reactivity of ozone and oxygen (O_2)

Criteria	Mark(s)
O_3 is more reactive than O_2 because the single (coordinate) covalent bond in O_3 requires less energy to break than the double covalent bond in the O_2 molecule.	**1**

(ii) one physical property of ozone and oxygen (O_2)

Criteria	Mark(s)
Higher solubility of ozone in water: Due to the unsymmetrical distribution of the electrons in the ozone molecule, ozone is slightly more polar than oxygen and hence more soluble in water, interacting via dipole-dipole interaction.	**1**

A **END OF TEST**