



Index Number:

NATIONAL CERTIFICATE OF EDUCATION

March / April 2021

CHEMISTRY (N530)

TIME: 45 MINUTES

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

1. Write your index number in the space provided above.
2. Write in dark blue or black ink. Do not use correction fluid.
3. You may use a soft pencil for any diagram, graph or rough working.
4. Diagrams are not drawn to scale unless otherwise specified.
5. Any rough working should be done in this booklet.
6. Answer **ALL** questions.
7. This document consists of **5** questions printed on **12** pages.
8. The total number of marks for this paper is **50**.
9. A copy of the Periodic Table is provided on page 14.

For Examiners' use							
Question No.	1	2	3	4	5	Total	Signature
Marker							
Team Leader							
Quality Controller							
CE/ACE							

QUESTION 1 : MULTIPLE CHOICE QUESTIONS (10 MARKS)

Marks

Circle the correct answer.

- a) Which process can increase the amount of oxygen in air?
- A** Photosynthesis
 - B** Respiration
 - C** Combustion
 - D** Lightning
- b) Which harmful gas can be removed from the exhaust gases of a petrol-powered car by its catalytic converter?
- A** Nitrogen
 - B** Steam
 - C** Carbon dioxide
 - D** Carbon monoxide
- c) Which pollutant is mostly produced by the decay of vegetable matter and animals?
- A** Sulfur dioxide
 - B** Methane
 - C** Carbon monoxide
 - D** Nitrogen dioxide
- d) Which of the following is a metal?
- A** Phosphorus
 - B** Iodine
 - C** Aluminium
 - D** Sulfur

e) What is the correct name for the compound having formula $\text{Fe}(\text{NO}_3)_3$?

- A Iron (II) nitrate
- B Iron (III) nitrate
- C Iron (II) nitride
- D Iron (III) nitride

f) A **molecule** of a compound is shown in Figure 1.1.

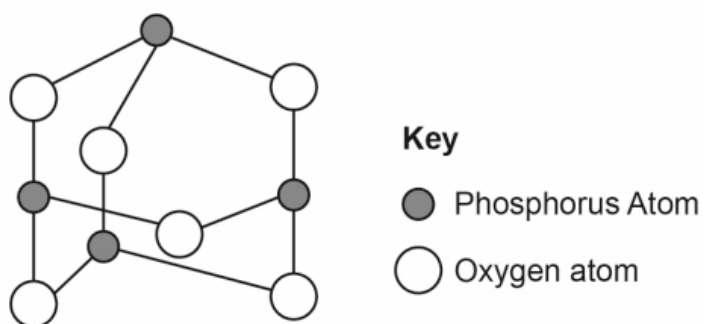


Figure 1.1

What is the formula of this molecule?

- A P_4O_6
- B PO_4
- C P_6O_4
- D PO_6

g) What is the total number of atoms in the formula $\text{Cu}(\text{NO}_3)_2$?

- A 5
- B 7
- C 8
- D 9

h) Which one of the following substances is a mixture?

- A Water
- B Ethanol
- C Air
- D Salt

i) The diagram below illustrates a simple distillation process.

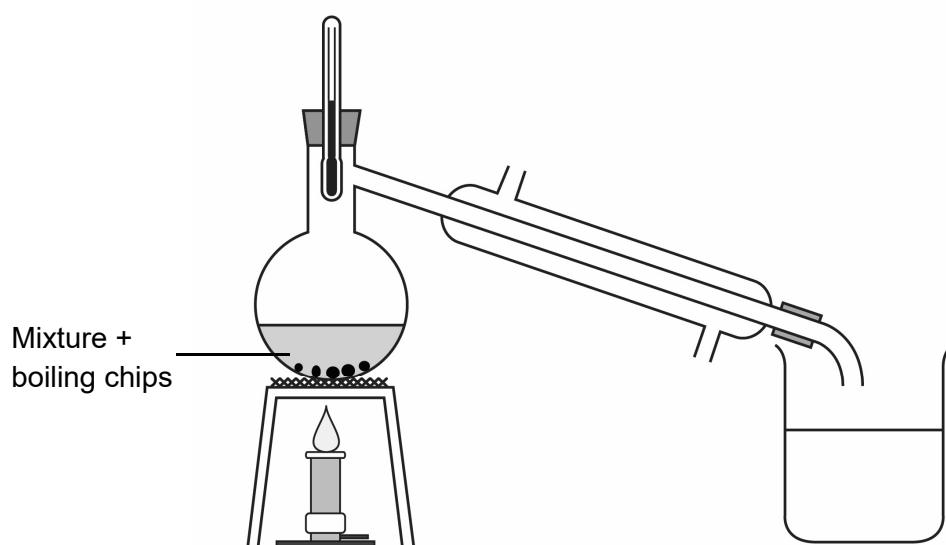


Figure 1.2

Why are boiling chips added to the mixture?

- A To increase the boiling point of the mixture.
- B To ensure the smooth boiling of the mixture.
- C To decrease the boiling point of the mixture.
- D To keep the boiling point of the mixture unchanged.

j) Which of the following methods is suitable for obtaining pure water from sea water?

- A Chromatography
- B Filtration
- C Decantation
- D Distillation

Marks

QUESTION 2 (10 MARKS)

Marks

- a) Figure 2.1 shows the process to separate a mixture of sodium chloride and ammonium chloride.
- i) Fill in the boxes A to D with the appropriate word(s) from the list given below.

Funnel, Burner, Sodium Chloride, Cotton wool plug,
Ammonium chloride, Evaporating dish

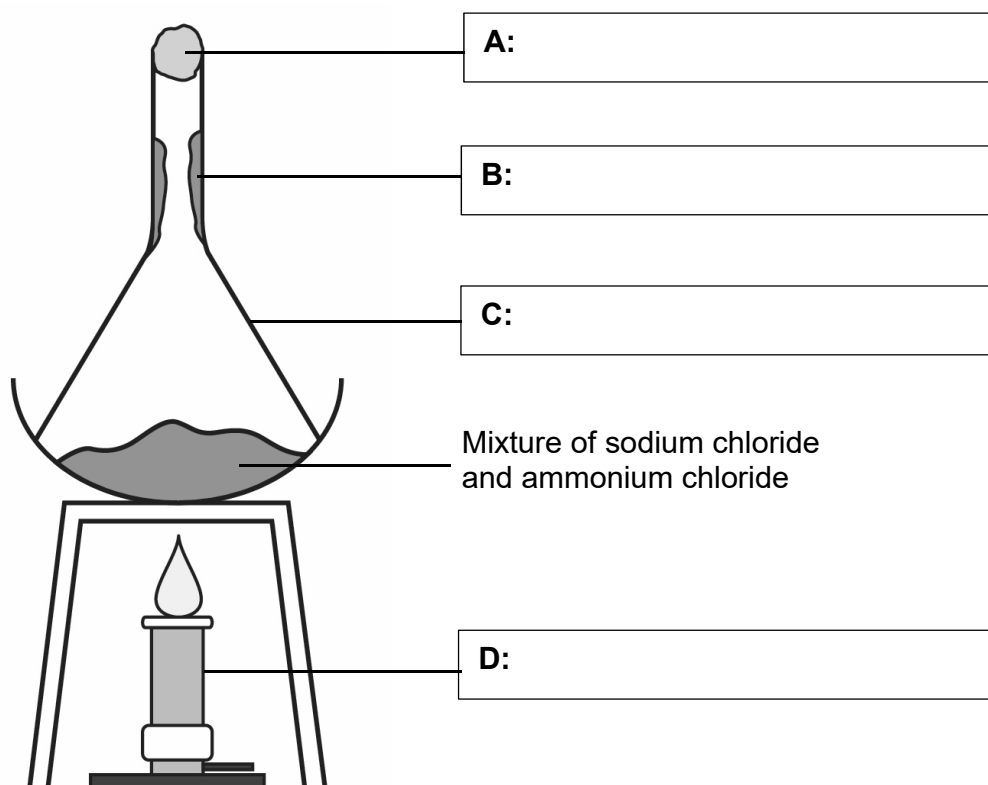


Figure 2.1

[4]

- ii) Name the process used in this separation technique.

[1]

- b) Figure 2.2 below shows the results of an experiment to identify the components of mixtures **X** and **Y**. Each mixture may contain one or more of the substances **A**, **B**, **C** and **D**.

Marks

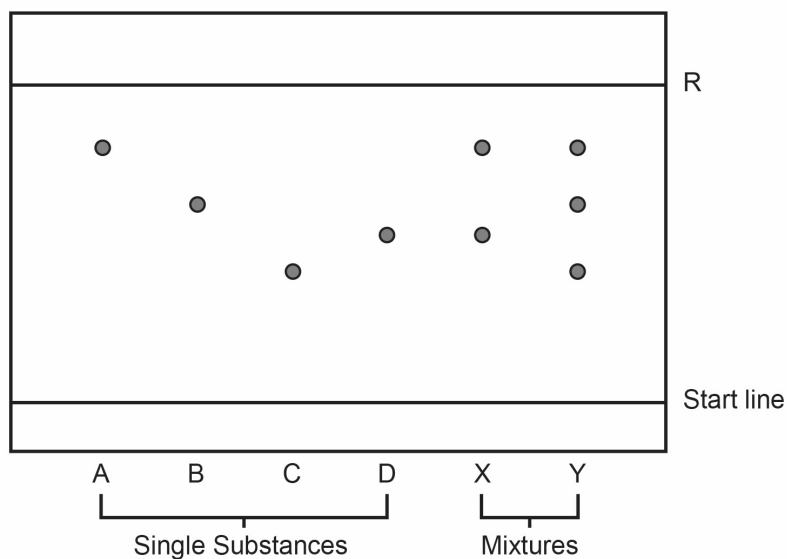


Figure 2.2

- i) What is the name given to this type of experiment?

[1]

- ii) What does the line **R** in Figure 2.2 represent?

R : _____

[1]

- iii) Why should the start line be drawn in pencil and not in ink?

[1]

- iv) Use Figure 2.2 to deduce which of the substances **A**, **B**, **C** and **D** are present in

Mixture X : _____

Mixture Y : _____

[2]

QUESTION 3 (7 MARKS)**Marks**

a) Fill in the blanks using the correct name of the reactant.

i) Zinc + _____ $\longrightarrow$ Zinc chloride + Hydrogen

[1]

ii) _____ + Sulfuric acid $\longrightarrow$ Sodium Sulfate + Water

[1]

b) Table 3.1 shows a list of some elements and their respective symbols and valencies.

Element	Symbol	Valency
Potassium	K	1
Aluminium	Al	3
Oxygen	O	2
Iodine	I	1
Nitrogen	N	3
Calcium	Ca	2
Sulfur	S	2, 4, 6
Iron	Fe	2, 3

Table 3.1

Write down the **formula** of the following compounds:

i) Calcium iodide: _____

[1]

ii) Aluminium oxide: _____

[1]

iii) Iron (II) sulfide: _____

[1]

c) Fill in the blanks to balance the following equations:

i) _____ Na + _____ H₂O $\longrightarrow$ _____ NaOH + H₂

ii) CaCO₃ + _____ HCl $\longrightarrow$ CaCl₂ + H₂O + CO₂

[2]

QUESTION 4 (9 MARKS)

Marks

The graph in Figure 4.1 below shows the concentration of oxides of nitrogen in a city over a twenty-four hour period.

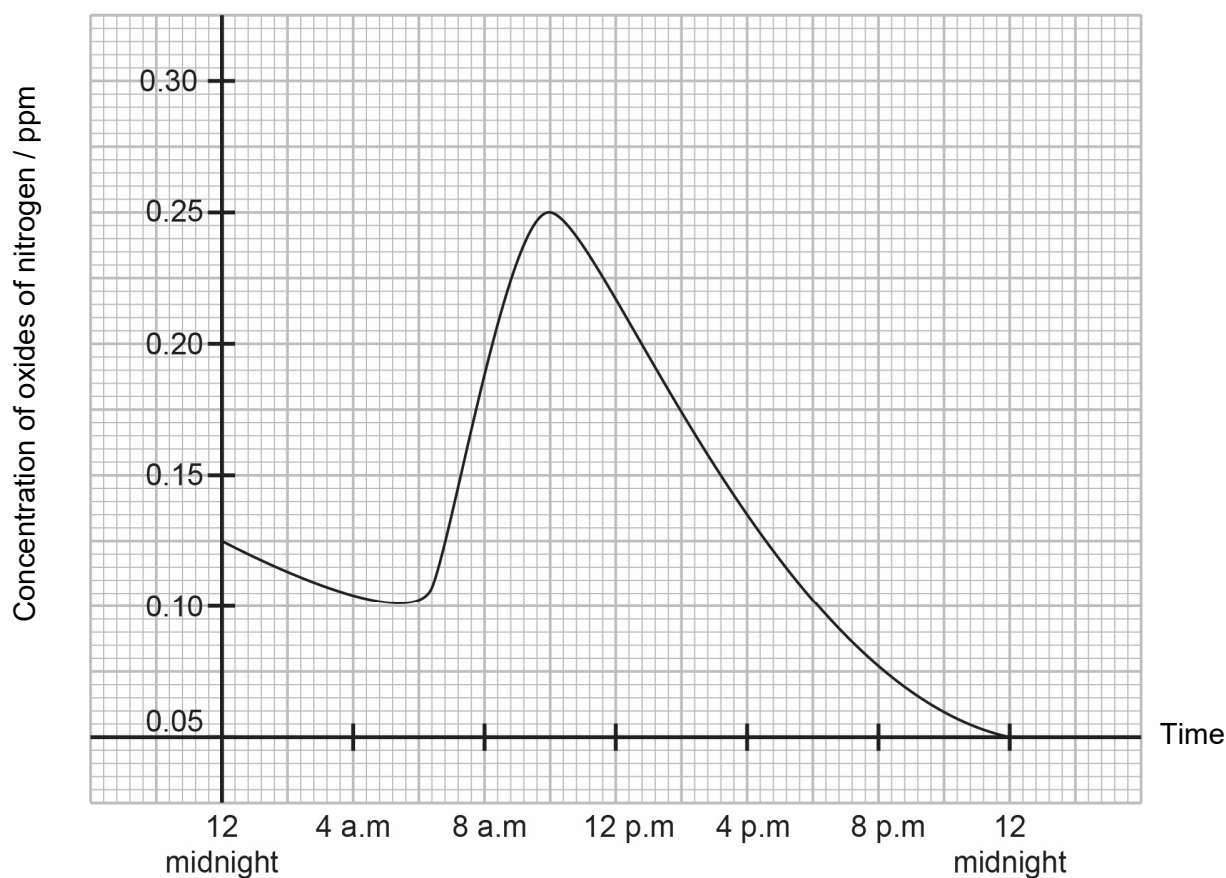


Figure 4.1

Use the graph to answer the question below.

- a) i) What is the maximum concentration, in ppm, of oxides of nitrogen?
- _____
- [1]
- ii) At what time of the day is the concentration of oxides of nitrogen the highest?
- _____
- [1]
- iii) Give one source of the oxides of nitrogen which results from **human activities**.
- _____
- [1]

- b) Figure 4.2 shows the presence of an ozone layer in the upper atmosphere.

Marks

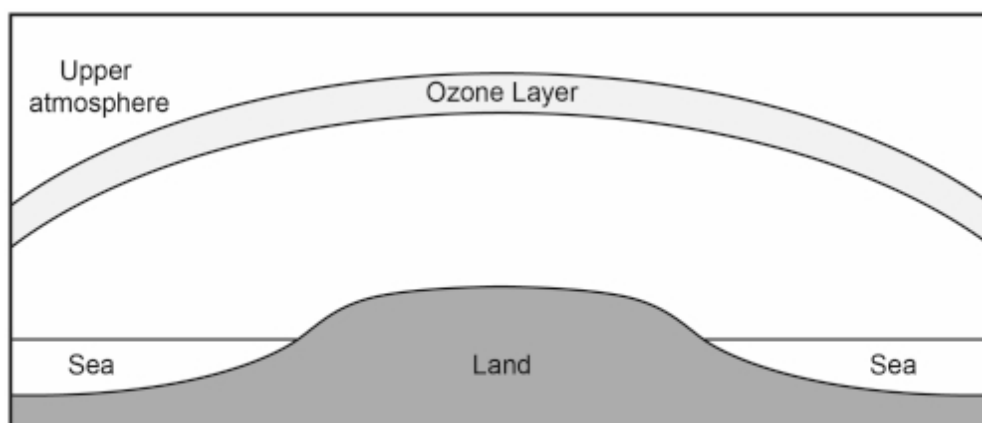


Figure 4.2

- i) State the importance of the ozone layer in the earth's atmosphere.

[1]

- ii) Name one type of compound responsible for ozone depletion.

[1]

- iii) Name one harmful effect of ozone depletion on human health.

[1]

c)	Water in ponds and lakes is often polluted by nitrates and phosphates.	Marks
i)	State one source of these pollutants.	
		[1]
ii)	Excess of dissolved pollutants causes an undesirable process in the water. What is the name of this process?	
		[1]
iii)	How is this process harmful to aquatic life?	
		[1]

QUESTION 5 (14 MARKS)

Marks

Four different metals are placed separately in test-tubes containing dilute hydrochloric acid as shown in Figure 5.1 below.

Bubbles of gas are seen.

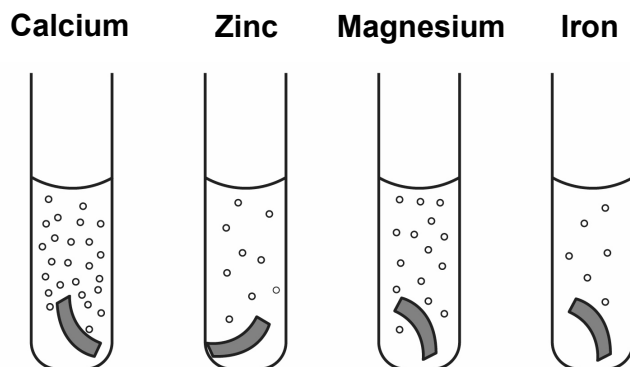


Figure 5.1

Observe the pictures carefully and answer the questions below:

- a) i) Which metal is
1. **most** reactive?

[1]

2. **least** reactive?

[1]

- ii) What observation allowed you to reach this conclusion?

[1]

- iii) What is the colour of the solution when iron reacts with hydrochloric acid?

[1]

- iv) Arrange the four metals Calcium, Zinc, Magnesium and Iron in order of their reactivity, starting with the most reactive.

Marks

..... , , ,

Most reactive $\longrightarrow$

[1]

- b) A student adds a few grams of powdered zinc to a copper sulfate solution and allows it to stand for some time. A reaction occurs.

- i) What is the colour change of the solution during the reaction?

From to

[2]

- ii) What is the solid **product** deposited at the end of the reaction?

[1]

- iii) Name the chemical reaction which occurs.

[1]

c)	Kevin conducts an experiment to investigate how sodium reacts with water. He drops a piece of sodium in a beaker of cold water carefully.	Marks
i)	Give two observations Kevin will make during the reaction. 1. _____ 2. _____	[2]
ii)	Mention one safety precaution when carrying out the experiment. _____	[1]
iii)	Sodium is stored in paraffin oil. Give a reason why. _____ _____ _____	[1]
iv)	Name another metal which will behave in a similar way to sodium. _____	[1]

The Periodic Table of Elements

Group																		
I	II											III	IV	V	VI	VII	VIII	
		H hydrogen																He helium
Li lithium	Be beryllium																	Ne neon
Na sodium	Mg magnesium																	Ar argon
K potassium	Ca calcium	Sc scandium	Ti titanium	V vanadium	Cr chromium	Mn manganese	Fe iron	Co cobalt	Ni nickel	Cu copper	Zn zinc	Ga gallium	Ge germanium	As arsenic	Se selenium	Br bromine	Kr krypton	
Rb rubidium	Sr strontium	Y yttrium	Zr zirconium	Nb niobium	Mo molybdenum	Tc technetium	Ru ruthenium	Rh rhodium	Pd palladium	Ag silver	Cd cadmium	In indium	Sn tin	Sb antimony	Te tellurium	I iodine	Xe xenon	
Cs caesium	Ba barium	lanthanoids		Hf hafnium	Ta tantalum	W tungsten	Re rhenium	Os osmium	Ir iridium	Pt platinum	Au gold	Hg mercury	Pb lead	Bi bismuth	Po polonium	At astatine	Rn radon	
Fr francium	Ra radium	actinoids		Rf rutherfordium	Db dubnium	Sg seaborgium	Bh bohrium	Hs hassium	Mt meitnerium	Ds darmstadtium	Rg roentgenium	Cn copernicium	Fl flerovium		Lv livermorium			

Blank Page

Blank Page