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Tick this box if you have NOT written in this booklet

Level 1 Chemistry 2021

90933 Demonstrate understanding of aspects of selected elements

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of selected elements.	Demonstrate in-depth understanding of aspects of selected elements.	Demonstrate comprehensive understanding of aspects of selected elements.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

A periodic table and other reference material are provided in the Resource Booklet L1–CHEMR.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–11 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (▨). This area may be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

QUESTION ONE

(a) Why do sodium ions and fluoride ions have different charges?

In your answer, you should explain why these elements form ions, and relate the charges of the ions to the position of the atoms on the periodic table.

(b) Lithium and sodium are both metals that are stored under oil.

(i) When a piece of sodium is removed from the oil, cut in half, and exposed to dry air, the shiny surface of the metal quickly dulls.

Explain this observation with links to the species involved.

(ii) Lithium and sodium both react with water.

Complete the equations below:

Word equation for **lithium** reacting with water:

lithium + water →

Balanced symbol equation for **sodium** reacting with water:

$Na + H_2O \rightarrow$

(iii) What would you observe when lithium and sodium are separately added to water?
Link your observations to the metals and products being formed.

(iv) Sodium will also react with dilute sulfuric acid, H_2SO_4.

Write a balanced symbol equation for this reaction:

QUESTION TWO

(a) Magnesium and calcium are in Group Two on the Periodic Table.

Which of the following statements are true in relation to their location in this group?

Tick (✓) TWO boxes.

Statement	**True (✓)**
They are more reactive than Group One elements.	
They have the same number of electrons in the outer shell.	
They have similar atomic numbers.	
They are involved in similar chemical reactions.	

Explain your choices.

(b) (i) Mild steel and stainless steel are both used in cars. Details about these types of steel are given in the table below.

Type of steel	Iron alloyed with	Use in cars
mild steel	carbon	body panels
stainless steel	carbon, chromium, and nickel	exhaust pipes

Why is mild steel used to make car body panels, and stainless steel used to make exhaust pipes, rather than using pure iron for these parts?

In your answer, you should refer to:

- the structure of iron and the alloys
- the physical and chemical properties of iron, mild steel, stainless steel, and the elements they are alloyed with.

(ii) Aluminium and copper have a variety of common uses in everyday life.

Which of these two metals is most likely to be used for ALL of the following purposes?

- overhead power cables
- aircraft bodies
- saucepans.

Justify your answer, with reference to relevant physical and / or chemical properties of BOTH metals.

QUESTION THREE

(a) Three gases that may be dissolved in water during their industrial use include:

- chlorine
- ozone
- ammonia.

To determine the effects of these gases on pH, a small amount of each gas was dissolved into separate samples of water. The three solutions were then tested with a digital pH meter. One solution had a pH greater than 7, the second had a pH less than 7, while the third solution had a pH equal to 7.

Justify the variation in pH of these three solutions.

Support your answer with balanced symbol equations for the reactions occurring.

Balanced symbol equations:

Question Three continues on the next page.

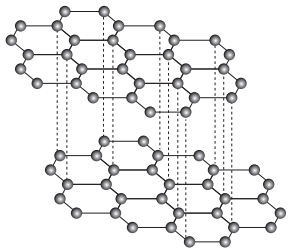
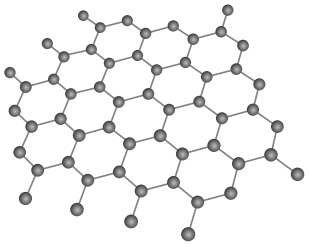
(b) Nitrogen is a non-metal element. It is used as a refrigerant to preserve sperm, eggs, and other cells for medical research, as a fire suppressant for electrical equipment, and as a preservative in food packaging.

(i) Give TWO properties of nitrogen.

(ii) Explain TWO of the uses given above, with links to the properties of nitrogen.

(c) Two allotropes of carbon are graphite and graphene. Each of these forms of carbon has a different structure, with different properties and uses.

(i) In the boxes below, identify each allotrope.

(ii) Why can graphene and graphite both be used as conductors of electricity?

In your answer, you should refer to the structure and bonding of the allotropes.

(iii) Why can graphite be used in pencil leads and as a lubricant in machinery, but graphene is unsuitable for these uses?

In your answer, you should refer to the structure and bonding of the allotropes.

Extra space if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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