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Tick this box if there is no writing in this booklet

SUPERVISOR'S USE ONLY

Level 1 Chemistry 2020

90933 Demonstrate understanding of aspects of selected elements

9.30 a.m. Friday 4 December 2020 Credits: Four

Achievement	Achievement with Merit Achievement with Exc	
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 and clearly number the question.

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

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

TOTAL

QUESTION ONE

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C 1	um is a silvery-white metal.
	Give two physical properties of calcium (other than colour).
	Physical property 1:
	Physical property 2:
	How does the reaction of calcium metal differ with each of the following reactants: oxygen, cold water, and dilute hydrochloric acid?
	In your answer, you should include:
	• observations that would be made when the calcium reacts with each of the reactant
	• links between any observations and the products being formed
	• balanced symbol equations for calcium reacting with each of the reactants.
	Balanced symbol equation for calcium reacting with oxygen:
	Balanced symbol equation for calcium reacting with cold water:
	Balanced symbol equation for calcium reacting with dilute hydrochloric acid:

70	more and contract the structures preparties and uses of these two substances	
	apare and contrast the structures, properties, and uses of these two substances.	
	our answer, you should:	
	describe the structure of both substances, and identify any similarities and differences	
	give TWO uses for EACH of the substances	
	relate the given uses to the relevant structure and properties of the substances.	
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QUESTION TWO

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escribe the reaction of chlorine with water xplain the nature of the aqueous solution formed ink the properties of chlorine to making water safer for people to swim in
ink the properties of chlorine to making water safer for people to swim in
nclude a balanced symbol equation for the reaction of chlorine with water.

Nitro	ogen is a non-metal.
(i)	Give the electron arrangement of nitrogen and its ion.
	Electron arrangement of nitrogen atom:
	Electron arrangement of nitrogen ion, N ³⁻ :
(ii)	How does the formation of non-metal ions differ from the formation of metal ions? In your answer, you should:
	• use nitrogen and an element from group II or III to illustrate your answer
	• refer to the positions of non-metals and metals on the periodic table.
(iii)	Nitrogen is often used in the food industry. It has a melting point of –210.0 °C and a boiling point of –195.8 °C.
	Describe the appearance of nitrogen at room temperature (25 °C).
	Colour:
	State:
(iv)	Give one use of nitrogen in the food industry, and link the use to the relevant properties of nitrogen.

QUESTION THREE

(a)

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Several metal elements are involved in the manufacture of a mobile phone.

- Mobile phone glass is made by replacing the sodium ions in standard glass with potassium ions, resulting in much stronger glass. Write the electron arrangements for sodium ions and potassium ions. (i) sodium ion: potassium ion: _ (ii) What is the relationship between the charges of sodium and potassium ions, and the position of their atoms on the periodic table? (iii) Sodium and potassium metals are not used for metal components such as wiring and casings in phones. Why are they not suitable for these uses? In your answer, you should refer to your knowledge of the chemical properties of sodium and potassium metals.
- (b) Table A below shows the purpose of some of the metals and alloys used in mobile phones.

Table A

Metal/metal alloy	Use in mobile phone
copper	wiring
lead	component of solder (tin and lead) for joining other metal parts
aluminium	battery casing
magnesium alloy	phone casing

Table B shows some of the physical properties of selected metals.

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Table B

	Physical property			
Metal	Density/kg m ⁻³	Melting point/°C	Hardness (Brinell) / MPa	Electrical conductivity /S m ⁻¹
copper	8 940	1 084	874	6.0×10^7
lead	11 340	328	38	4.9×10^6
aluminium	2712	660	245	3.5×10^7
magnesium	1738	650	260	2.5×10^{7}
zinc	7 140	420	412	1.7×10^7

- (i) Why are copper, lead, and aluminium suitable for the purposes given in table A on page 6? In your answer, you should:
 - use the information in table B

metal.

Question Three continues on the following page.

meta	nesium metal can be alloyed with other elements, such as aluminium, zinc, or other als.
	is magnesium alloy used, rather than pure magnesium metal, for mobile phone ngs?
In y	our answer, you should refer to:
•	the structure of the alloy
•	the relevant physical and chemical properties of magnesium and the metals it may be alloyed with.

		Extra paper if required.	
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