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Level 1 Chemistry 2022

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.

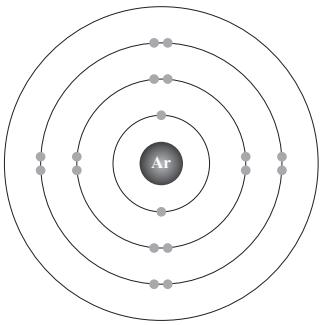
If you need more room for any answer, use the extra space provided at the back of this booklet.

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



Scientists have a sample containing the **ion** of an unknown element 'X'.

It is known that:

- the ion's charge is either +1 or –1
- the ion's electron arrangement is the same as argon, Ar.

(a) Name the TWO atoms that could form the ion, and draw the electron arrangement for each of the atoms in the boxes below.

You may refer to the periodic table in the resource booklet.

Name of atom:	Name of atom:
Electron arrangement:	Electron arrangement:

(b) Explain why the possible ions of element 'X' have the same electron arrangement, but different charges.

In your answer, you should:

- explain why ions form
- state the possible symbols (with charges) of the element 'X' ions.

(c) One of the options for element ‘X’ forms a positive ion on reaction with water. Lithium also reacts with water.

Compare the chemistry involved in the reaction of each of these elements with water.

In your answer, you should:

- write the symbol of the positive ion that X forms
- describe any observations of the reactions with water
- explain the nature of the aqueous solutions formed and how you could confirm this in a laboratory
- include balanced symbol equations for the reactions.

Symbol for positive ion that X forms:

Balanced symbol equations:

QUESTION TWO

Source: http://passivehouse1nz.blogspot.com/2012/05/wiring.html

Source: www.sciencelearn.org.nz/images/1961-copper-wire

Source: https://kids.kiddle.co/images/e/e2/NIGU_transmision_line_near_Te_Kauwhata.JPG

(a) Copper and aluminium can be used for electrical wiring in buildings and transmission lines.

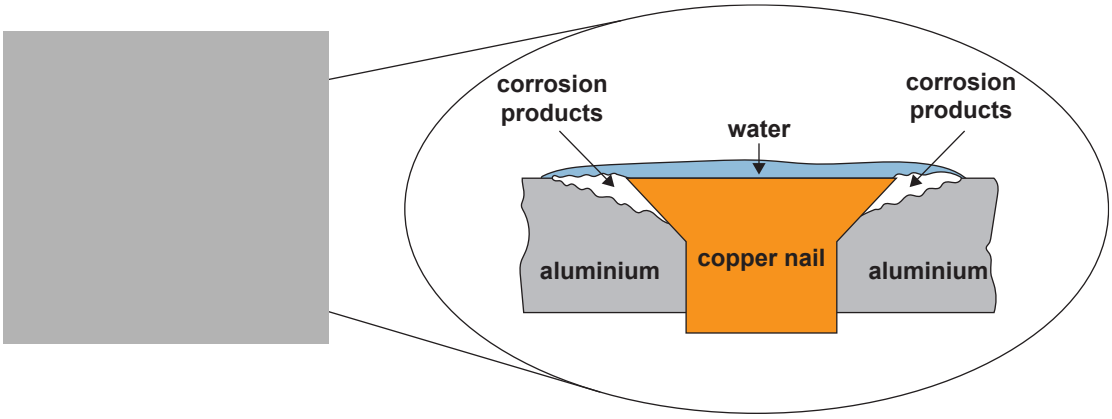
With reference to their physical and chemical properties, explain why copper and aluminium are suitable for this purpose.

In your answer, you should refer to:

- the physical properties of copper and aluminium
- the chemical properties of copper and aluminium
- in particular why transmission lines are usually made of aluminium rather than copper.

Include a balanced symbol equation to support your answer.

Balanced symbol equation:



Adapted from: www.canada.ca/en/conservation-institute/services/training-learning/in-person-workshops/galvanic-corrosion.html

(b) Aluminium and copper can also be used as roofing materials. Copper nails cannot be used to fasten aluminium, as corrosion can occur.

Explain why this happens, and what the consequences of it could be.

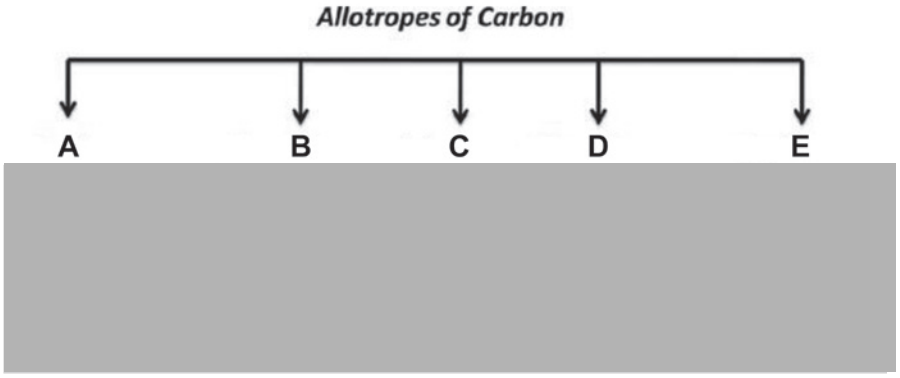
You may refer to the activity series in the resource booklet.

(c) The duralumin family of alloys are based on the metals aluminium, copper, manganese, and magnesium. They are especially suited to aircraft construction. To prevent corrosion of the alloy, a thin layer of aluminium is added.

(i) Define the term alloy.

(ii) Explain why it is advantageous to use an alloy, such as duralumin, in aircraft construction instead of pure aluminium.

QUESTION THREE



Adapted from: www.researchgate.net/figure/The-generation-of-synthetic-carbon-allotropes-6_fig2_334695239

(a) Select the correct letter from the diagram for the following allotropes of carbon:

Allotrope	Letter/Diagram
Diamond	
Graphite	
Graphene	
Nanotube	
Buckminsterfullerene	

(b) State a use for two of the allotropes of carbon, and explain the properties of each that make that use appropriate.

Name of allotrope: _____

Use and explanation: _____

Name of allotrope: _____

Use and explanation: _____

(c) Sulfur is the non-metal element shown in the image on the right.

Source: https://chemistrytalk.org/sulfur-element/

(i) What would be observed as sulfur burns in oxygen when held over a Bunsen burner flame?

(ii) Write a balanced symbol equation for the combustion of sulfur.

Balanced symbol equation:

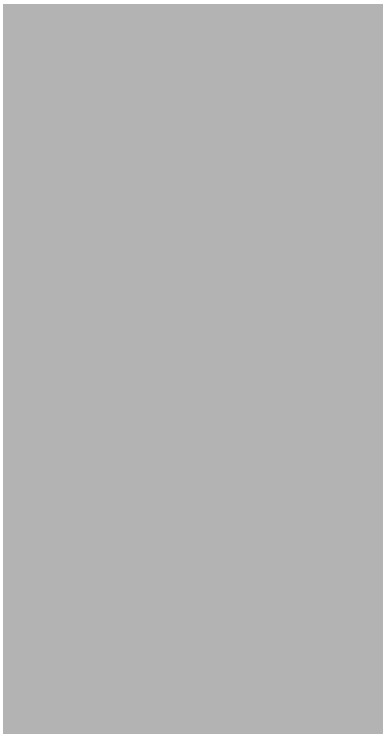
(iii) Explain ONE consequence, to people or the environment, of sulfur dioxide entering the environment (air) due to combustion.

Question Three continues on the next page.

(iv) Sulfur dioxide is often added to foods such as dried fruit, sausages, and wine to preserve them.

Explain how sulfur dioxide preserves food.

You should refer to its chemical properties in your answer.



Source: www.straganzdrowia.pl/blog/dieta-fitness/suszone-owoce-dobre-na-zime#

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

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