Website: contoureducation.com.au | **Phone:** 1800 888 300
Email: hello@contoureducation.com.au

VCE Chemistry ½
Metals & Covalent Lattices [1.3]
Homework

Homework Outline:

Compulsory	Pg 2 – Pg 9
Supplementary	Pg 10 – Pg 18

Section A: Compulsory (47 Marks)

Sub-Section: Explain the Metallic Bonding Model

Question 1 (4 marks)

Write each of the following metals in their metal ion form:

a. Calcium. (1 mark)

_____

b. Rubidium. (1 mark)

_____

c. Francium. (1 mark)

_____

d. Beryllium. (1 mark)

_____

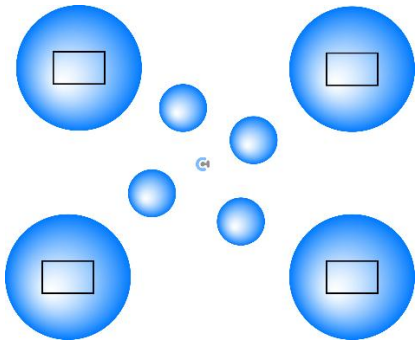
Question 2 (4 marks)

Suppose there exist 4 sodium atoms that exist next to each other in space.

a. Write a sodium atom's ion form, classifying the ion type. (1 mark)

_____

b. Draw the metallic lattice of these sodium atoms, including all the aspects of metallic bonding. (3 marks)



Question 3 (5 marks)

Magnesium is a highly common metal found on Earth and is important in several industries.

a. State magnesium's ion form. (1 mark)

_____

b. State the key aspect of the metallic bonding model that allows it to stay together even though magnesium ions are positive and should repel each other. (1 mark)

_____

c. Explain how these magnesium atoms would form metallic bonds. (3 marks)

_____

_____

_____

_____

Space for Personal Notes

Sub-Section: Identify Properties of Metals (High MP/BP, Electrical & Thermal Conductivity, Malleability & Ductility, Lustre)

Question 4 (3 marks)

a. State what defines if a substance can conduct electricity. (1 mark)

_____

b. Explain how metals can conduct electricity very easily, with reference to metallic bonding and lattices. (2 marks)

_____

_____

_____

Question 5 (3 marks)

Between the metals Lithium and Beryllium, explain which would more likely have a higher melting point.

_____

_____

_____

_____

Space for Personal Notes

Question 6 (5 marks)

Consider an ingot of Calcium metal.

a. Pencil lead tends to break quite easily when excessive force is applied, but we see that the ingot of calcium metal will tend to just bend but not break. Explain this phenomenon with reference to calcium's properties. (3 marks)

_____

_____

_____

_____

b. Calcium metal in its pure form is also known for being quite shiny. Explain the chemical phenomena behind this observation. (2 marks)

_____

_____

_____

Space for Personal Notes

Sub-Section: Explain the Covalent Lattice Structures Bonding & Properties of Diamond and Graphite

Question 7 (2 marks)

Explain the main difference between the covalent lattices of diamond and graphite.

_____

_____

Question 8 (6 marks)

Explain the following properties of diamond.

a. Is it able to conduct electricity? (2 marks)

_____

_____

_____

b. Is it able to conduct heat? (2 marks)

_____

_____

_____

c. What is the relative durability or toughness of it? (2 marks)

_____

_____

_____

Question 9 (4 marks)

List and explain two differences in property between the two main allotropes of carbon.

a. Property 1. (2 marks)

_____

_____

_____

b. Property 2. (2 marks)

_____

_____

_____

Space for Personal Notes

Sub-Section: Final Boss

Question 10 (11 marks)

Consider the element of potassium.

a. What is potassium's ion form? (1 mark)

_____

b. Potassium is a commonly used element, but is also similar to another element, calcium. Compare their melting points to each other. (3 marks)

_____

_____

_____

_____

c. Hence, from the above, which one would you choose to be melted into a liquid form with energy efficiency in mind? (1 mark)

_____

d. The lattices of metals such as potassium are often compared to the covalent lattices of carbon allotropes. Compare the lattices of potassium with graphite and explain how that affects their properties. (4 marks)

_____

_____

_____

_____

_____

_____

e. For electronic device purposes, we may choose to use graphite over potassium for circuitry requirements. Suggest a reason why this may be the case. (2 marks)

_____

_____

_____

Space for Personal Notes

Section B: Supplementary (48 Marks)

Sub-Section: Explain the Metallic Bonding Model

Question 11 (3 marks)

The metallic bonding has several key features that define it.

a. What type of force exists between multiple metal atoms? (1 mark)

_____

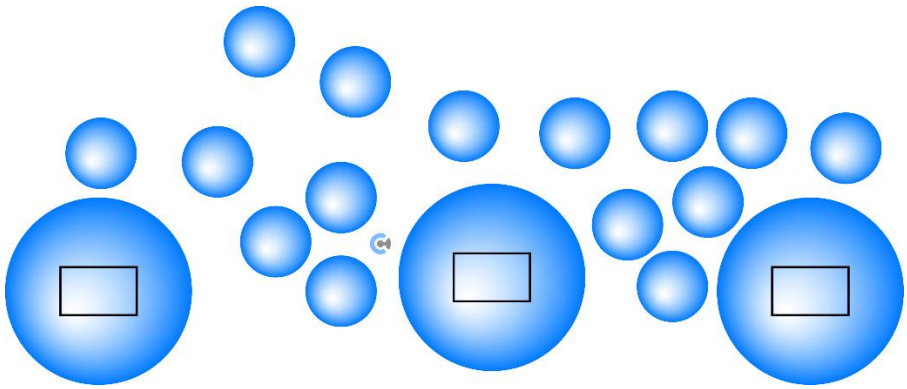
b. Explain what a 'metallic character' is. (2 marks)

_____

_____

Question 12 (2 marks)

Draw the metallic lattice when you have 3 atoms of Aluminium.



Space for Personal Notes

Question 13 (5 marks)

Copper is a versatile metal extensively used in electrical wiring and other applications.

a. What type of metal is copper considered, and what is the usual charge of this metal? (1 mark)

_____

b. Identify a key feature of the metallic bonding model that enables copper to conduct electricity efficiently. (1 mark)

_____

_____

c. Describe how copper atoms would interact to form metallic bonds. (3 marks)

_____

_____

_____

_____

Question 14 (7 marks)

Metals are important for human development, as they have unique properties from metallic bonding. Consider the structure and bonding of metals such as lithium and beryllium.

a. Define ‘delocalised electrons’ and explain their role in metallic bonding. (2 marks)

_____

_____

b. How does the metallic character change across the period? (2 marks)

_____

_____

c. Iron is commonly used in construction and manufacturing. Write its most likely ion form. (1 mark)

_____

d. How is a metal like iron different to another metal like potassium? (2 marks)

_____

_____

_____

_____

Space for Personal Notes

Sub-Section: Identify Properties of Metals (High MP/BP, Electrical & Thermal Conductivity, Malleability & Ductility, Lustre)

Question 15 (1 mark)

Define the property of malleability.

_____

_____

Question 16 (3 marks)

Between metals of potassium and sodium, explain which one would have a higher melting point and explain why.

_____

_____

_____

_____

_____

Question 17 (4 marks)

Most metals that you can think of often have a shiny 'metallic' look to them.

a. Explain this phenomenon. (2 marks)

_____

_____

b. Suppose that Alex is preparing to have a BBQ on his metal grill on a sunny day. If it had been sitting out in the sun for a few hours, what would happen if Alex touched the hood of the BBQ grill? (2 marks)

_____

_____

_____

_____

Question 18 (7 marks)

You are given the following clues about four unknown metals X, Y, Z, and W:

- Metal X has two valence electrons.
- Metal Y has a larger atomic radius than X.
- Metal Z has more delocalised electrons than the other three metals.
- Metal W has the weakest metallic bonding of all four metals.

a. Given that the metals are either Radium, Calcium, Magnesium, or Aluminium, state the identities of the metals. (3 marks)

_____

_____

b. Can the strongest metal that you have stated in **part a.**, be turned into a wire? In your answer, include the name of this property. (2 marks)

_____

_____

_____

_____

c. Why would you consider metallic bonding to be stronger than dipole-dipole interactions? (2 marks)

_____

_____

_____

_____

Space for Personal Notes

Sub-Section: Explain the Covalent Lattice Structures Bonding & Properties of Diamond and Graphite

Question 19 (1 mark)

Define what an allotrope is and give an example.

Question 20 (3 marks)

Explain what a sublimation point is and relate it to a carbon allotrope.

Question 21 (6 marks)

Carbon exists in different forms with distinct properties.

a. Explain why graphite conducts electricity, but diamond does not. (2 marks)

b. Which allotrope of carbon would you select for the purpose of sharpness and durability? Explain your answer. (2 marks)

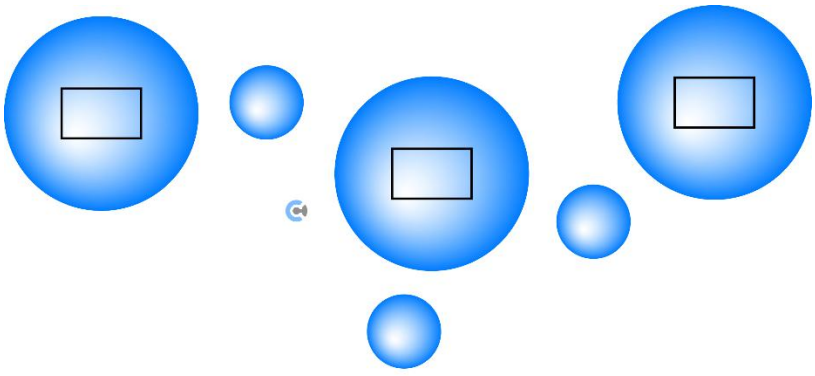
c. Explain what amorphous forms of carbon are. (2 marks)

Question 22 (6 marks)

Consider the allotrope of graphite.

a. What is the main element comprising graphite? (1 mark)

b. Draw a structure of graphite containing 3 carbons. (2 marks)



Make sure each C has 3 bonds

c. Explain why graphite is very hard in one direction but very soft and weak in another direction, with reference to its structure and bonding. (3 marks)

_____

_____

_____

_____

_____

Space for Personal Notes

CONTOUREDUCATION

Website: contoureducation.com.au | **Phone:** 1800 888 300 | **Email:** hello@contoureducation.com.au

VCE Chemistry ½

Free 1-on-1 Support

Be Sure to Make The Most of These (Free) Services!

- Experienced Contour tutors (45+ raw scores, 99+ ATARs).
- For fully enrolled Contour students with up-to-date fees.
- After school weekdays and all-day weekends.

1-on-1 Video Consults	Text-Based Support
➢ Book via bit.ly/contour-chemistry-consult-2025 (or QR code below). ➢ One active booking at a time (must attend before booking the next).	➢ Message +61 440 137 304 with questions. ➢ Save the contact as "Contour Chemistry".

Booking Link for Consults
bit.ly/contour-chemistry-consult-2025

Number for Text-Based Support
+61 440 137 304