# 2.18 Chemical Bonding: Ionic, Covalent and Metallic: 10-minute Pack

AQA 8464 · Calculator allowed · about 10 minutes

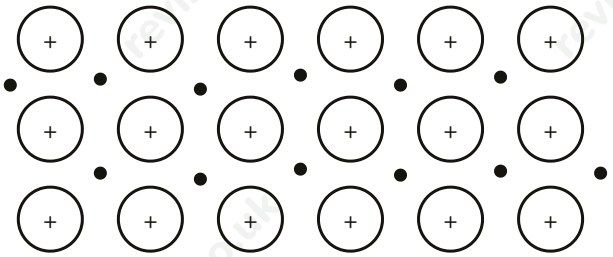
Total Marks

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions. Show all your working.**

**1** Figure 3 shows a simplified representation of the structure of a metal.

Figure 3



**(a)** Describe the structure of a metal in terms of metallic bonding. **(2)**

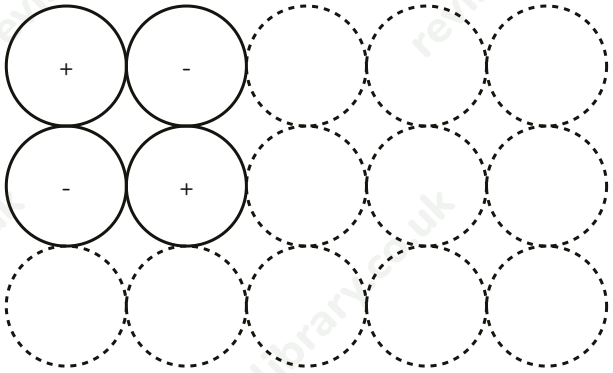
**(b)** Using Figure 3, identify (i) what the circles marked '+' represent and (ii) what the small dots represent, and state what holds the structure together. **(2)**

**(Total for Question 1 is 4 marks)**


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**2** Figure 5 shows the start of a 2D grid representing a small section of the giant ionic lattice found in an ionic compound such as sodium chloride.

Figure 5




**(a)** Complete Figure 5 to show the alternating arrangement of positive and negative ions in the giant ionic lattice, and add a note to show that the pattern continues in all directions. **(3)**

**(Total for Question 2 is 3 marks)**


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# Mark scheme · 2.18 Chemical Bonding: Ionic, Covalent and Metallic: 10-minute Pack

## Question 1

(a) a metal consists of a giant, regular lattice of positive metal ions oe **B1**

(a) surrounded by a 'sea' of delocalised electrons, free to move throughout the whole structure oe **B1**

**(a) Answer: A metal consists of a giant regular lattice of positive metal ions, surrounded by a 'sea' of delocalised electrons that are free to move throughout the whole structure, not fixed to one particular ion.**

(b) circles marked + = positive metal ions (cations); small dots = delocalised (free) electrons **B1**

(b) held together by strong electrostatic forces of attraction between the positive ions and the delocalised electrons (the metallic bond) **B1**

**(b) Answer: (i) The circles marked + represent the positive metal ions. (ii) The small dots represent the delocalised (free) electrons. The structure is held together by strong electrostatic forces of attraction between the positive ions and the delocalised electrons.**

## Question 2

(a) at least a 3x3 grid of ions shown in a regular, repeating pattern **B1**

(a) ions correctly labelled with alternating + and - charges throughout the grid **B1**

(a) diagram or accompanying note indicates that the pattern continues/repeats in all directions (e.g. dashed edges or a written note), showing it is part of a much larger giant structure **B1**

**(a) Answer: A completed 3x3 (or larger) grid of alternating positive and negative ions, each ion touching four oppositely charged neighbours, with the edges shown as continuing (for example with dashed lines or a note) to indicate the pattern repeats in all directions as part of a much larger giant lattice.**


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