

How ions bond: transfer and lattices

Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test covers ion formation, formulae, the structure of ionic lattices and the properties of ionic compounds. Show how you balance charges, give electron arrangements where asked, and write explanations in complete sentences.

Level: Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** HS-PS1-3, GCSE C2

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Magnesium oxide (3 marks)

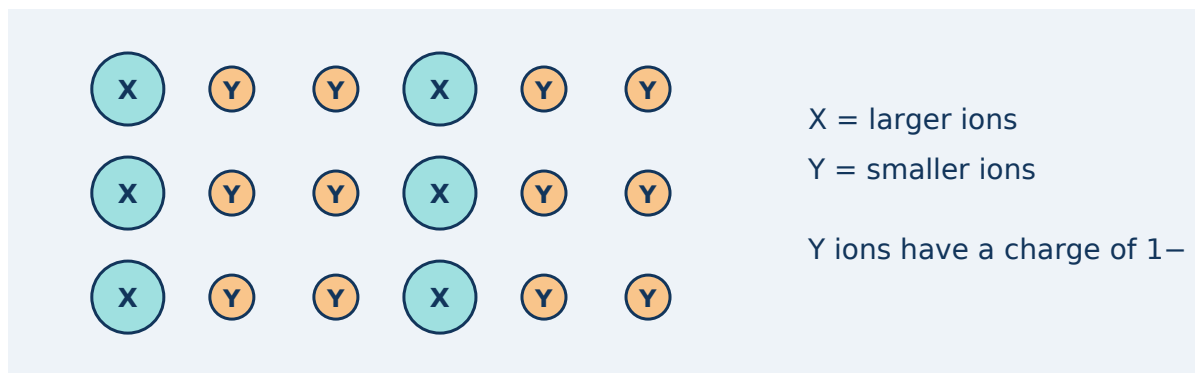
Magnesium (2,8,2) reacts with oxygen (2,6).

- Describe the transfer of electrons. (1 mark)
- State the charge on each ion formed. (1 mark)
- Give the formula of the compound. (1 mark)

Question 2 Crystal diagram (3 marks)

The diagram shows part of an ionic crystal.

- Give the ratio of X ions to Y ions. (1 mark)
- Write the formula of the compound. (1 mark)
- Deduce the charge on the X ions. (1 mark)



Part of a crystal of compound XY with ions X and Y.

Question 3 Conduction (3 marks)

Explain why sodium chloride conducts electricity when molten but not when solid. (3 marks)

Question 4 Aluminium oxide (2 marks)

Aluminium forms Al^{3+} ions and oxygen forms O^{2-} ions. Work out the formula of aluminium oxide and show your working. (2 marks)

Question 5 Melting points compared (3 marks)

Sodium chloride melts at $801\text{ }^{\circ}\text{C}$ and magnesium oxide melts at $2852\text{ }^{\circ}\text{C}$. Explain the difference. (3 marks)

Question 6 Counting ions (2 marks)

A crystal of sodium oxide, Na_2O , contains 6.0×10^{20} sodium ions. Calculate the number of oxide ions. (2 marks)

Question 7 Brittle crystal (2 marks)

Explain why ionic crystals are brittle. (2 marks)

Question 8 Ion arrangements (2 marks)

Calcium has atomic number 20 and bromine has atomic number 35. State the electron arrangement of a calcium ion Ca^{2+} and the number of electrons in a bromide ion Br^- . (2 marks)