

Reactivity trends in group 2 and the halogens

Chemistry grades 11-12 (A Level · IB · Class 11-12) · Test

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

This test covers the reactions and trends of group 2 and the halogens, with explanation and calculation. Answer all questions, show your working and include units. You have 45 minutes and the test is worth 20 marks.

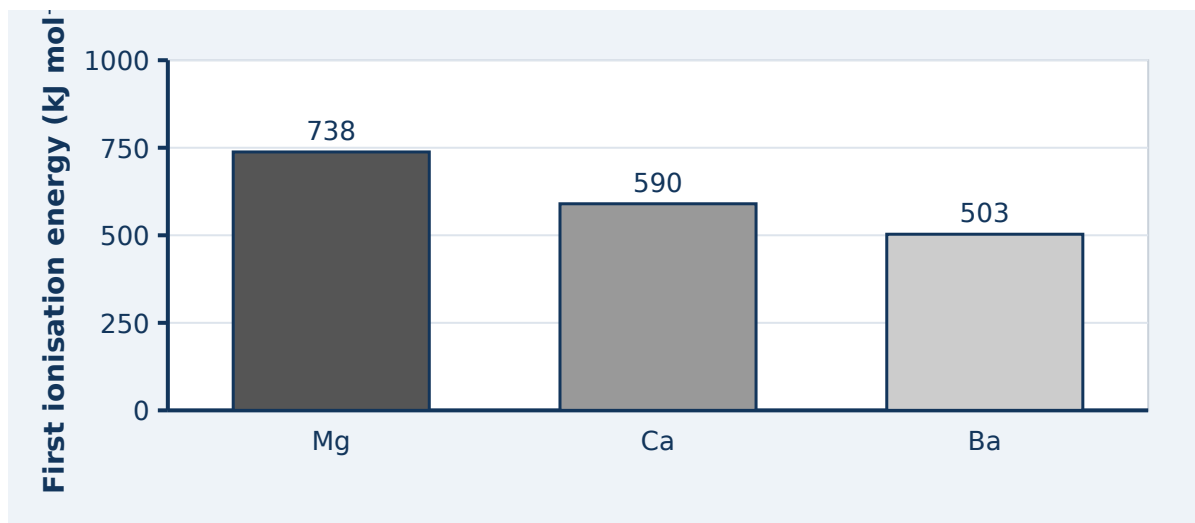
Level: Chemistry grades 11-12 (A Level · IB · Class 11-12) · **Curriculum:** A Level 3.2.2-3.2.3

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

Question 1 Calcium and water (2 marks)

- a. Describe two observations when calcium is added to cold water. (2 marks)

Question 2 Ionisation energy trend (2 marks)



First ionisation energies of three group 2 metals.

- a. Use the figure to explain why barium is more reactive than magnesium. (2 marks)

Question 3 Testing for sulfate (3 marks)

- a. Describe how to test a solution for sulfate ions and give the positive result. (2 marks)
b. Write the ionic equation. (1 mark)

Question 4 Magnesium and acid (2 marks)

- a. Calculate the volume of hydrogen ($24.0 \text{ dm}^3 \text{ mol}^{-1}$) from 2.43 g of magnesium ($A_r = 24.3$) and excess hydrochloric acid. (2 marks)

Question 5 Halogen displacement (2 marks)

- a. Predict what is seen when bromine water is added to potassium iodide solution and write the ionic equation. (2 marks)

Question 6 Trend in boiling points (2 marks)

- a. Explain why the boiling point of bromine (59°C) is higher than that of chlorine (-34°C). (2 marks)

Question 7 Making bleach (3 marks)

- a. Chlorine reacts with cold dilute sodium hydroxide: $\text{Cl}_2 + 2\text{NaOH} \rightarrow \text{NaCl} + \text{NaClO} + \text{H}_2\text{O}$. Give the oxidation states of chlorine in Cl_2 , NaCl and NaClO . (1 mark)
- b. Explain why this is disproportionation. (2 marks)

Question 8 Limewater concentration (4 marks)

- a. 25.0 cm^3 of saturated calcium hydroxide solution needs 20.00 cm^3 of $0.0500 \text{ mol dm}^{-3}$ hydrochloric acid. Write the equation. (1 mark)
- b. Calculate the concentration of the calcium hydroxide in mol dm^{-3} . (2 marks)
- c. Calculate the solubility in g dm^{-3} ($M_r = 74.1$). (1 mark)