InkChemistry

QUESTION WORKBOOK

Group 7: trends down the group and displacement reactions

Group 2 and Group 7 · Unit C13

AQA 3.2.3.1 · OCR A 3.1.3

18 questions · 61 marks

PRINT EDITION

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SECTION A · Short, 1 to 2 marks

A1 GTDG-Q10 Suggest which atom carries the partial negative charge in the polar molecule iodine monochloride, ICl, and explain why. [2]

SECTION B · Standard, 3 to 5 marks

B1 GTDG-Q1 State the physical state and colour at room temperature of chlorine, bromine and iodine, and the colour of iodine vapour. [4]

B2 GTDG-Q2 Explain why the boiling points of the halogens increase from fluorine to iodine, and why the Br–Br bond is not broken when bromine boils. [4]

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B3 GTDG-Q3 Explain the trends in atomic radius and in electronegativity from fluorine to iodine. [4]

B4 GTDG-Q5 Give the ionic equation, with state symbols, for the reaction of chlorine water with potassium bromide solution, the two half-equations, and the species that is oxidised. [4]

B5 GTDG-Q9 Suggest the physical state and colour of astatine at room temperature, and how its electronegativity compares with iodine's. Explain each suggestion. [4]

B6 GTDG-Q4 Explain why chlorine is a stronger oxidising agent than iodine. [3]

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B7 GTDG-Q6 Describe what is seen when bromine water is added to potassium iodide solution and the mixture is then shaken with cyclohexane, and explain why the organic layer is coloured. [3]

B8 GTDG-Q11 Suggest why fluorine is never used in school displacement tests, and what happens when fluorine is bubbled into water. Give an equation for the reaction with water. [3]

B9 GTDG-Q12 Compare the colours of bromine and iodine in water and in cyclohexane, and use the comparison to explain why cyclohexane is added in displacement tests. [3]

B10 GTDG-Q13 Calculate the mass of iodine formed when excess chlorine water is added to 25.0 cm^3 of 0.100 mol dm^{-3} potassium iodide solution. Ar of I = 126.9. [3]

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B11 GTDG-Q14 Calculate the volume of chlorine gas, in cm^3 at room temperature and pressure, that reacts with 50.0 cm^3 of 0.200 mol dm^{-3} sodium bromide solution. Molar gas volume = 24.0 dm^3 mol^{-1}. [3]

B12 GTDG-Q16 Evaluate a student's conclusion that bromine water reacted with potassium chloride solution, based on the mixture being orange. [3]

B13 GTDG-Q19 Explain why the F–F bond (158 kJ mol^{-1}) is weaker than the Cl–Cl bond (243 kJ mol^{-1}), although the Cl–Cl, Br–Br and I–I bonds weaken down the group. [3]

B14 GTDG-Q20 Calculate the enthalpy change for $H_2(g) + F_2(g) \rightarrow 2HF(g)$ from the bond enthalpies H–H 436, F–F 158 and H–F 562 kJ mol^{-1}. [3]

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B15 GTDG-Q21 Suggest why a red-hot wire placed in hydrogen iodide produces purple fumes, while one placed in hydrogen chloride produces no change. Give the equation for the change that is seen. [3]

B16 GTDG-Q22 Justify the conclusion that a colourless solution contains iodide ions and not bromide ions, from the observation that it turns brown when chlorine water is added and that the colour moves into a purple layer when cyclohexane is added and the tube is shaken. [3]

SECTION C · Long, 6 marks or more

C1 GTDG-Q18 Explain how the reactions of chlorine water, bromine water and iodine solution with solutions of potassium chloride, bromide and iodide show the order of oxidising power of the halogens. Include observations and equations. [6]

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