InkChemistry

QUESTION WORKBOOK

Formulae, equations and state symbols

Working in the laboratory · Unit C00

AQA 3.1.2.5 · OCR A 2.1.2, 2.1.4

20 questions · 66 marks

PRINT EDITION

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SECTION A · Short, 1 to 2 marks

A1 FE-Q2

Give the formulae of the seven elements that exist as diatomic molecules at room temperature. [2]

A2 FE-Q15

Identify the precipitate formed when calcium nitrate solution is mixed with sodium carbonate solution, and give its ionic equation. [2]

A3 FE-Q22

Explain what the formula $CuSO_4 \cdot 5H_2O$ shows, and why the crystals turn white when heated. [2]

SECTION B · Standard, 3 to 5 marks

B1 FE-Q3

Complete and balance these two equations, adding the state symbols that are missing: the complete combustion of propane, $C_3H_8(g) + O_2 \rightarrow CO_2 + H_2O$, and the reduction of iron(III) oxide in a blast furnace, $Fe_2O_3(s) + CO(g) \rightarrow Fe(l) + CO_2(g)$. [4]

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B2 FE-Q4 Explain why a student who balances the equation for hydrogen burning in oxygen as $H_2(g) + O_2(g) \rightarrow H_2O_2(l)$ is wrong, and give the correct balanced equation with state symbols. [4]

B3 FE-Q5 State the four state symbols used in equations, and explain why ethanol in water is written $C_2H_5OH(aq)$ but water itself is always $H_2O(l)$. [4]

B4 FE-Q8 Suggest why the enthalpy change of neutralisation is almost the same for hydrochloric acid with sodium hydroxide as for nitric acid with potassium hydroxide, but slightly less exothermic for ethanoic acid with sodium hydroxide. [4]

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B5 FE-Q10 Compare what happens, and the equations, when barium chloride solution is mixed with sodium sulfate solution and when barium nitrate solution is mixed with potassium sulfate solution. [4]

B6 FE-Q13 Give the two half-equations, with state symbols, for zinc powder becoming coated with silver in silver nitrate solution, and combine them into the ionic equation, showing how the electrons are balanced. [4]

B7 FE-Q1 Give the formulae of calcium hydroxide, aluminium sulfate and ammonium carbonate. [3]

B8 FE-Q6 Explain why sodium ions and chloride ions do not appear in the ionic equation for the reaction of barium chloride solution with sodium sulfate solution. [3]

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B9 FE-Q7 Give the ionic equation, with state symbols, for the reaction of silver nitrate solution with potassium bromide solution, and name the spectator ions. [3]

B10 FE-Q9 Suggest the identity of the yellow precipitate formed when lead(II) nitrate solution is mixed with potassium iodide solution, and give the ionic equation for its formation. [3]

B11 FE-Q11 Describe how an ionic equation is written from a balanced full equation with state symbols. [3]

B12 FE-Q16 Evaluate a student's ionic equation for magnesium with hydrochloric acid: $Mg(s) + 2H^+(aq) + 2Cl^-(aq) \rightarrow Mg^{2+}(aq) + 2Cl^-(aq) + H_2(g)$. [3]

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B13 FE-Q18 Explain why the formula of iron(III) sulfate is $Fe_2(SO_4)_3$. [3]

B14 FE-Q19 Give the formulae of potassium sulfate, ammonium nitrate and sodium ethanoate. [3]

B15 FE-Q20 Explain why the ionic equation for hydrochloric acid with sodium carbonate solution contains $CO_3^{2-}(aq)$, but the ionic equation for hydrochloric acid with calcium carbonate contains $CaCO_3(s)$. [3]

B16 FE-Q21 Suggest the identity of the pale blue solid that forms when sodium hydroxide solution is added to blue copper(II) sulfate solution, and give the ionic equation, with state symbols, for its formation. [3]

SECTION C · Long, 6 marks or more

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C1 FE-Q14 Explain what is seen when dilute hydrochloric acid is added in turn to solid magnesium oxide, to solid magnesium carbonate and to sodium hydroxide solution, and what the full and ionic equations show about what reacts. [6]

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