AQA AS/A-level Year 1 Chemistry exam practice answers

**4 Energetics**

**1 (a)** amount of Ca = 0.56/40.1 = 0.0140 mol [1]

 **(b)** amount of HCl used = (25.0/1000) × 2.0 = 0.050 mol [1]

 **(c)** Ca + 2HCl → CaCl2 + H2 [1]

 **(d)** 0.014 mol of Ca reacts with (2 × 0.014) mol of HCl, i.e. 0.028 mol; there is 0.050 mol of Ca present; so the acid is in excess (by 0.050 mol − 0.028 mol) [1]

 **(e)** *q* = *mc****q* = 25.0 × 4.18 × (32.0 − 21.1) [1] = 1139 J, or 1.14 kJ [1]

 **(f)** Δ*H* = −1.14 kJ/0.014 mol = −81.4 kJ mol−1 [1]

**2** Δ*H* = energy required to break bonds − energy released on forming bonds

 −11 = 158 + 242 − (2 × *E*(I–Cl)) [1]

 *E*(I–Cl) = (158 + 242 + 11)/2 [1]; = + 205.5 kJ mol−1 [1] or any other appropriate method of working

**3** Equation for the combustion is C4H8(g) + 6O2(g) → 4CO2(g) + 4H2O(l) [1]

 Δ*H*combustion (C4H8) = (4 × −393.5) + (4 × −285.8) − (+1.2) [1]

 −1574 − 1143.2 − 1.2 = −2718.4 kJ mol−1 [1]

**4** ∆*H* = Σ∆*H*f (products) – Σ∆*H*f (reactants) [1] or a correct cycle

 (2 × −680) + (6 × −269) − *x* = −2889 [1]

 *x* = 2889 − 1360 − 1614 = −85 (kJ mol–1) [1]