

1(a)(i)	$\text{Sr}(\text{HCO}_3)_2 \rightarrow \text{SrCO}_3 + \text{CO}_2 + \text{H}_2\text{O}$
1(a)(ii)	M1: radius of cation / M^{2+} increases OR charge density of cation / M^{2+} decreases M2: less polarisation / less distortion of the anion / carbonate ion
1(b)	M1: least soluble $\text{CaF}_2 < \text{SrF}_2 < \text{BaF}_2$ most soluble M2: ΔH_{latt} and ΔH_{hyd} both become less exothermic / less negative M3: ΔH_{hyd} changes less / becomes less exothermic by a smaller extent OR ΔH_{latt} changes more / becomes less exothermic by a larger extent M4: ΔH_{sol} becomes more exothermic / more negative
1(c)(i)	enthalpy change when one mole of gaseous ions dissolve in water to form a solution
1(c)(ii)	M1: ionic radii AND ionic charge M2: (ionic) radii increase / charge density decreases AND ΔH_{hyd} decreases/less exothermic AND less attraction between water molecules and (gaseous) ions OR as ionic charge increases / charge density increases AND ΔH_{hyd} increases/more exothermic AND more attraction between water molecules and (gaseous) ions
1(d)	M1: use of $-2957 / -1926 / -505$ AND $2 \times (-505)$ M2: correct signs and evaluation ΔH_{sol} of $\text{MgF}_2(\text{s}) = -1926 + (2 \times -505) - (-2957) = (+)21 \text{ kJ mol}^{-1}$
1(e)(i)	M1: $K_{\text{sp}} = [\text{Hg}_2^{2+}] [\text{F}^-]^2$ M2: units = $\text{mol}^3 \text{ dm}^{-9}$
1(e)(ii)	$K_{\text{sp}} = 2^2 \times (9.20 \times 10^{-3})^3 = 3.11 \times 10^{-6}$ min 2sf

1(a)	$\text{Mg}(\text{NO}_3)_2 \rightarrow \text{MgO} + 2\text{NO}_2 + \frac{1}{2}\text{O}_2$ OR $2\text{Mg}(\text{NO}_3)_2 \rightarrow 2\text{MgO} + 4\text{NO}_2 + \text{O}_2$
1(b)	M1: $\text{Mg}(\text{NO}_3)_2$ / magnesium nitrate AND magnesium ion / Mg^{2+} AND is smaller / has higher charge density M2: nitrate ion / anion is more distorted / polarised
1(c)(i)	magnesium sulfate and water / MgSO_4 and H_2O
1(c)(ii)	M1: magnesium sulfate / A has a more exothermic ΔH_{latt} and ΔH_{hyd} M2: difference in ΔH_{hyd} is greater M3: magnesium sulfate / A has a more exothermic ΔH_{sol}

2(a)	M1: (solubility) decreases down the group M2: ΔH_{latt} and ΔH_{hyd} decrease / become less exothermic / less negative M3: ΔH_{hyd} decreases / changes more / dominant factor / becomes less exothermic by a larger extent OR ΔH_{latt} decreases / changes less / changes slower M4: ΔH_{sol} becomes less exothermic / less negative OR ΔH_{sol} becomes (more) endothermic / (more) positive
2(b)(i)	$\text{Ag}_2\text{CrO}_4(\text{s}) \rightleftharpoons 2\text{Ag}^+(\text{aq}) + \text{CrO}_4^{2-}(\text{aq})$
2(b)(ii)	M1: $K_{\text{sp}} = [\text{Ag}^+]^2 [\text{CrO}_4^{2-}]$ M2: $\sqrt[3]{(1.12 \times 10^{-12} \div 4)} = 6.54 \times 10^{-5}$ M3: $[\text{Ag}^+] = 2 \times 6.54 \times 10^{-5} = 1.31 \times 10^{-4} (\text{mol dm}^{-3})$ min 2sf

2(c)(i)	$K_{\text{a}} = 10^{-6.49} = 3.236 \times 10^{-7}$ $[\text{H}^+]^2 = 8.08984 \times 10^{-9}$ M1: $[\text{H}^+] = 8.99 \times 10^{-5}$ M2: $\text{pH} = -\log(8.99 \times 10^{-5}) = 4.05$ min 2sf
2(c)(ii)	conjugate acid H_2CrO_4 AND conjugate base CrO_4^{2-}
2(d)(i)	(the energy change / released when) one mole of gaseous atoms become 1^- ions / gain one mole of electrons
2(d)(ii)	due to repulsion between negative ion and incoming / gained electron
2(d)(iii)	$2\text{Ag}^+(\text{g}) \text{ S}^{2-}(\text{g}) \rightarrow \text{Ag}_2\text{S}(\text{s})$
2(d)(iv)	M1: selection of correct six numbers only: $-33, 731, 279, -200, 532, -2677$ M2: use of $\times 2$ as only multiplier with Ag M3: correct signs and evaluation of data $-33 = 2\Delta H_{\text{lat}} + (2 \times 731) + 279 + (-200) + 532 + (-2677)$ $2\Delta H_{\text{lat}} = 571 (\text{kJ mol}^{-1})$ $\Delta H_{\text{lat}} = +285.5 (\text{kJ mol}^{-1})$
2(e)	Ag_2S smaller / less negative / less exothermic lattice energy AND larger ionic radius (of cation)