

4(a)	energy required when one mole of gaseous atoms is formed from the element
4(b)	energy released when one mole of gaseous atoms gains one mole of electrons and becomes one mole of gaseous 1^- ions
4(c)	M1: iodine atom has greater radius M2: less attraction between nucleus and incoming electron in iodine
4(d)	M1: $\frac{1}{2}(-486 + (2 \times 364))$ M2: +121

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: $[\text{Ag}^+] = 2 \times 6.54 \times 10^{-5} = 1.31 \times 10^{-4} \text{ (mol dm}^{-3}\text{)}$ 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 $-33 = 2\Delta H_{\text{lat}} + (2 \times 731) + 279 + (-200) + 532 + (-2677)$ $2\Delta H_{\text{lat}} = 571 \text{ (kJ mol}^{-1}\text{)}$ $\Delta H_{\text{lat}} = +285.5 \text{ (kJ mol}^{-1}\text{)}$
2(e)	Ag_2S smaller / less negative / less exothermic lattice neergy AND larger ionic radius (of cation)