

Question	Marking Guidance	Mark	Comments
1(a)(i)	(Enthalpy change for formation of) 1 mol (of $\text{CaF}_2$ ) from its ions  ions in the gaseous state	1  1	allow heat energy change do not allow energy or wrong formula for $\text{CaF}_2$ penalise 1 mol of ions CE=0 if atoms or elements or molecules mentioned ignore conditions  ions can be mentioned in M1 to score in M2 allow fluorine ions $\text{Ca}^{2+}(\text{g}) + 2\text{F}^{-}(\text{g}) \rightarrow \text{CaF}_2$ scores M1 and M2
1(a)(ii)	(enthalpy change when) 1 mol of gaseous (fluoride) ions (is converted) into aqueous ions / an aqueous solution	1	allow $\text{F}^{-}(\text{g}) \rightarrow \text{F}^{-}(\text{aq})$ (ignore + aq) do not penalise energy instead of enthalpy allow fluorine ions do not allow $\text{F}^{-}$ ions surrounded by water
1(b)	water is polar / H on water is $\delta+$ / is electron deficient / is unshielded  ( $\text{F}^{-}$ ions) attract water / $\delta+$ on H / hydrogen	1  1	penalise $\text{H}^{+}$ on water 1 mark  allow H on water forms H-bonds with $\text{F}^{-}$ allow fluorine ions penalise co-ordinate bonds for M2 penalise attraction to O for M2

1(c)	$\Delta H = -(-2611) - 1650 + 2 \times -506$  $= -51 \text{ (kJ mol}^{-1}\text{)}$	1	ignore cycles M1 is for numbers and signs correct in expression
		1	correct answer scores 2 ignore units even if incorrect