Question	Marking Guidance	Mark	Comments
1(a)	Enthalpy change when 1 mol of an (ionic) compound/lattice (under standard conditions) Is dissociated/broken/separated into its (component) ions The ions being in the gaseous state (at infinite separation)	1 1 1	Allow heat energy change Mark independently. Ignore any conditions.
1(b)	There is an attractive force between the nucleus of an O atom and an external electron.	1	Allow any statement that implies attraction between the nucleus and an electron
1(c)	$Mg^{2+}(g) + O(g) + 2e^-$ $Mg^{2+}(g) + O^-(g) + e^-$ $Mg^{2+}(g) + O^{2-}(g)$ First new level for Mg^{2+} and O above last on L Next level for Mg^{2+} and O^- below that Next level for Mg^{2+} and O^{2-} above that and also above that for Mg^{2+} and O	1 1 1 1	Ignore lack of state symbols Penalise incorrect state symbols If levels are not correct allow if steps are in correct order with arrows in the correct direction and correct ΔH values Allow +124 Allow M4 with incorrect number of electrons
1(d)	LE MgO = 602 + 150 + 736 + 1450 + 248 - 142 + 844 = +3888 kJ mol^{-1}	1 1	Note use of 124 instead of 248 CE=0 Allow 1 for -3888 Allow no units Penalise wrong units

1(e)	Forms a protective layer/barrier of MgO / MgO prevents oxygen attacking Mg	1	Allow activation energy is (very) high Allow reaction (very) slow
1(f)	$\Delta G = \Delta H - T\Delta S$ ΔS = (-602 - (-570)) × 1000/ 298 = -107 J K^{-1} mol^{-1} / -0.107 kJ K^{-1} mol^{-1}	1 1 1	$\Delta S = \frac{(\Delta H - \Delta G)}{T}$ If units not correct or missing, lose mark Allow -107 to -108 +107 with correct units scores max 1/3
1(g)	1 mol of solid and 0.5 mol of gas reactants form 1 mol solid products System becomes more ordered	1 1	Decrease in number of moles (of gas/species) Allow gas converted into solid Numbers of moles/species, if given, must be correct Allow consequential provided ΔS is -ve in 1(f) If ΔS is +ve in 1(f) can only score M1