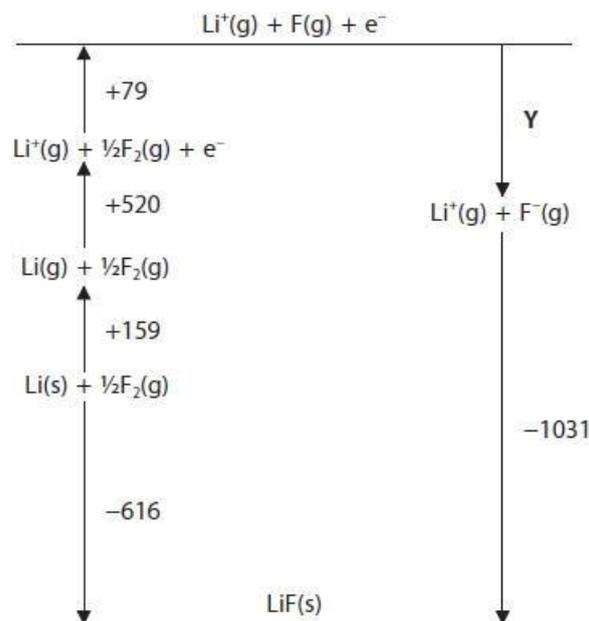## Questions

Q1.

This question is about ions and ionic compounds.

The diagram, which is not drawn to scale, shows the Born-Haber cycle for lithium fluoride. The energy changes are given in kJ mol^{-1}.

What is the value for **Y**, in kJ mol^{-1}?

(1)

    ☒ **A**   −273
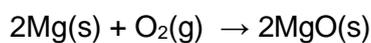   ☒ **B**   −343
    ☒ **C**   −432
    ☒ **D**   −889

(Total for question = 1 mark)

Q2.

This question is about entropy.

What is the standard molar entropy change, $\Delta S_{system}^{\ominus}$, in J K^{-1} mol^{-1}, for the reaction shown?

$$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$$

Substance	Standard molar entropy, $S^{\ominus}$ / J K^{-1} mol^{-1}
Mg(s)	32.7
O$_2$(g)	205.0
MgO(s)	26.9

(1)

☒ **A**   +210.8

☒ **B**   −210.8

☒ **C**   +216.6

☒ **D**   −216.6

(Total for question = 1 mark)

Q3.

This question is about enthalpy changes and entropy changes.

What is the expression for ΔS_{total}?

(1)

☒ **A** $\Delta S_{surroundings} + \dfrac{\Delta H}{T}$

☒ **B** $\Delta S_{surroundings} - \dfrac{\Delta H}{T}$

☒ **C** $\Delta S_{system} + \dfrac{\Delta H}{T}$

☒ **D** $\Delta S_{system} - \dfrac{\Delta H}{T}$

(Total for question = 1 mark)

Q4.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Sodium hydride, NaH, can be used to generate hydrogen for fuel cells.

Lattice energies provide an indication of ionic bond strength.

Which are the lattice energies of the hydrides NaH, KH and MgH$_2$?

(1)

	Lattice energy / kJ mol^{-1}		
	Sodium hydride, NaH	Potassium hydride, KH	Magnesium hydride, MgH$_2$
☐ A	−804	−711	−1018
☐ B	−804	−711	−2718
☐ C	−804	−911	−1018
☐ D	−804	−911	−2718

(Total for question = 1 mark)

Q5.

This question is about enthalpy changes and entropy changes.

Which reaction has a negative value for ΔS_{system}?

(1)

☐ **A** $2Cu(s) + O_2(g) \rightarrow 2CuO(s)$

☐ **B** $2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$

☐ **C** $MgCO_3(s) + H_2SO_4(aq) \rightarrow MgSO_4(aq) + H_2O(l) + CO_2(g)$

☐ **D** $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$
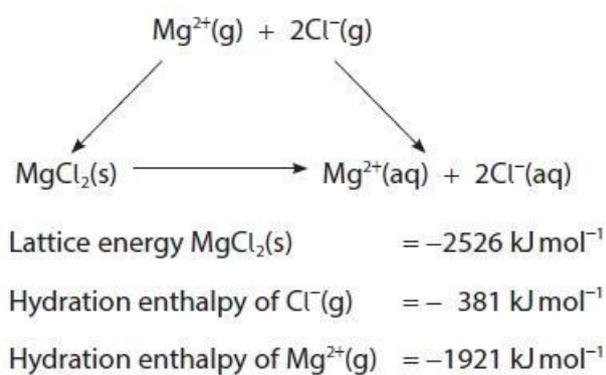
(Total for question = 1 mark)

Q6.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about dissolving different compounds.

What is the value, in kJ mol^{-1}, for the standard enthalpy change of solution of magnesium chloride?

$$Mg^{2+}(g) + 2Cl^-(g)$$

$$MgCl_2(s) \longrightarrow Mg^{2+}(aq) + 2Cl^-(aq)$$

Lattice energy $MgCl_2(s)$ $= -2526$ kJ mol^{-1}

Hydration enthalpy of $Cl^-(g)$ $= -381$ kJ mol^{-1}

Hydration enthalpy of $Mg^{2+}(g)$ $= -1921$ kJ mol^{-1}

(1)

☒ **A**   +157

☒ **B**   −157

☒ **C**   +224

☒ **D**   −224

(Total for question = 1 mark)