15.1 Energy Cycles

Question Paper

Course	DP IB Chemistry
Section	15. Energetics/Thermochemistry (HL only)
Topic	15.1 Energy Cycles
Difficulty	Medium

Time allowed: 10

Score: /5

Percentage: /100

Question 1

Thermodynamic data for the components for magnesium oxide are

Name of enthalpy change	Energy change (kJ mol^{-1})
Enthalpy of formation of magnesium oxide	-602
Enthalpy of atomisation of magnesium	150
First and second ionisation energy of magnesium	2188
Enthalpy of atomisation of oxygen	248
First and second electron affinity of oxygen	702

Which of the following is used to calculate the lattice enthalpy of magnesium oxide

A. -602 - 150 - 2188 - 248 + 702

B. -602 - 150 - 2188 - 248 - 702

C. -602 - 150 - 2188 - $\frac{248}{2}$ - 702

D. -602 - 150 - 2188 - (2 x 248) - 702

[1 mark]

Question 2

Using the information in the table to answer the question

Enthalpy Change	Value (kJ mol^{-1})
$\Delta H^{\ominus}_{\text{latt}}\, CaF_2$	2651
$\Delta H^{\ominus}_{\text{hyd}}\, Ca^{2+}$	-1616
$\Delta H^{\ominus}_{\text{hyd}}\, F^-$	-504

Which of the following is the correct value for the enthalpy change of solution, $\Delta H^{\ominus}_{\text{sol}}$, of calcium fluoride, CaF_2?

A. +2651 + [(-1616) + (-504)]

B. +2651 - [(-1616) + (-504)]

C. +2651 + [(-1616) + (-1008)]

D. +2651 - [(-1616) + (-1008)]

[1 mark]

Question 3

Which of the following ionic compounds has the greatest lattice enthalpy?

A. Potassium chloride

B. Calcium bromide

C. Beryllium oxide

D. Silver bromide

[1 mark]

Question 4

Which of the following changes is **not** endothermic?

A. $K(g) \rightarrow K^+(g) + e^-$

B. $Cl(g) + e^- \rightarrow Cl^-(g)$

C. $Ca(s) \rightarrow Ca(g)$

D. $O^-(g) + e^- \rightarrow O^{2-}(g)$

[1 mark]

Question 5

Which statements are correct for ionic compounds?

I. Solubility in water depends on the relative magnitude of the lattice energy compared to the hydration energy
II. Melting points of ionic compounds increase as the size of the cation increases
III. The enthalpy of solution for calcium chloride is represented by $CaCl_2(s) \rightarrow CaCl_2(aq)$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]