

Aims

You have learned how to construct Born-Haber cycles and calculate lattice enthalpies from experimental data. In this activity you have the opportunity to apply your knowledge to some more challenging examples. You will need to have studied Topics 12.1 and 12.2 before attempting these problems.

Questions

- 1 a) Write an equation for the formation of aluminium oxide.
- b) Using the enthalpy change values in the table below, construct a Born-Haber cycle and calculate the lattice enthalpy of aluminium oxide.

Change	Enthalpy change	Value / kJ mol^{-1}
$2\text{Al}(s) + \frac{3}{2}\text{O}_2(g) \rightarrow \text{Al}_2\text{O}_3(s)$	Heat of formation	-1675.7
$\text{Al}(s) \rightarrow \text{Al}(g)$	Heat of atomisation	+324.3
$\text{Al}(g) \rightarrow \text{Al}^+(g)$	First ionisation energy	+578
$\text{Al}^+(g) \rightarrow \text{Al}^{2+}(g)$	Second ionisation energy	+1817
$\text{Al}^{2+}(g) \rightarrow \text{Al}^{3+}(g)$	Third ionisation energy	+2745
$\frac{1}{2}\text{O}_2(g) \rightarrow \text{O}(g)$	Heat of atomisation	+249.2
$\text{O}(g) \rightarrow \text{O}^-(g)$	First electron affinity	-141.4
$\text{O}^-(g) \rightarrow \text{O}^{2-}(g)$	Second electron affinity	+790.8

- c) Comment on the value you have calculated.
- 2 The standard enthalpy change of the formation of $\text{MgO} = -602\text{kJ mol}^{-1}$.

Calculate the standard enthalpy change for the reaction



Aqa Chemistry A2 Stretch And Challenge Answers

Ted Lister



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