

1. Use the data below to calculate the electron affinity of chlorine:

Process	Enthalpy change/ kJmol^{-1}
Standard enthalpy of atomisation of potassium	+90
First ionisation enthalpy of potassium	+420
Bond dissociation enthalpy of chlorine	+244
Lattice enthalpy of potassium chloride	-706
Standard enthalpy of formation of potassium chloride	-436

_____ / kJmol^{-1}

2. Calculate the lattice enthalpy of sodium chloride from the following data:

Process	Enthalpy change/ kJmol^{-1}
$\text{Na(s)} \rightarrow \text{Na(g)}$	+109
$\text{Na(g)} \rightarrow \text{Na}^+(\text{g}) + \text{e}^-$	+494
$\text{Cl}_2(\text{g}) \rightarrow 2\text{Cl(g)}$	+242
$\text{Cl(g)} + \text{e}^- \rightarrow \text{Cl}^-(\text{g})$	-360
$\text{Na(s)} + \frac{1}{2}\text{Cl}_2(\text{g}) \rightarrow \text{NaCl(s)}$	-411

_____ / kJmol^{-1}

3.a) Calculate the electron affinity of chlorine from the following data:

Process	Enthalpy change/ kJmol^{-1}
$\text{Ca(s)} \rightarrow \text{Ca(g)}$	+190
$\text{Ca(g)} \rightarrow \text{Ca}^{2+}(\text{g}) + 2\text{e}^-$	+1730
$\frac{1}{2}\text{Cl}_2(\text{g}) \rightarrow \text{Cl(g)}$	+121
$\text{Ca}^{2+}(\text{g}) + 2\text{Cl}^-(\text{g}) \rightarrow \text{CaCl}_2(\text{s})$	-2184
$\text{Ca(s)} + \text{Cl}_2(\text{g}) \rightarrow \text{CaCl}_2(\text{s})$	-795

_____ / kJmol^{-1}

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$\text{Ca(s)} + \text{Cl}_2(\text{g}) \rightarrow \text{CaCl}_2(\text{s})$	-795

b) Use the reactions

$\text{Ca(g)} \rightarrow \text{Ca}^+(\text{g}) + \text{e}^-$	+590
$\text{Ca}^+(\text{g}) + \text{Cl}^-(\text{g}) \rightarrow \text{CaCl(s)}$	-760

To calculate the standard enthalpy of formation of CaCl(s) and hence explain why CaCl_2 is formed in preference to CaCl .

_____ / kJmol^{-1}