

### 5.1 EXERCISE 3 – IONIC COMPOUNDS IN SOLUTION

1. Calculate the enthalpy of solution of sodium chloride given the following data (all in  $\text{kJmol}^{-1}$ ):  
enthalpy of hydration of  $\text{Na}^+$ : -405  
enthalpy of hydration of  $\text{Cl}^-$ : -364  
lattice enthalpy of  $\text{NaCl}$ : -780
2. Calculate the enthalpy of solution of the hydroxides of barium, calcium and magnesium given the following data (all in  $\text{kJmol}^{-1}$ ):  
lattice enthalpy of  $\text{Ba(OH)}_2$ : -2235  
lattice enthalpy of  $\text{Ca(OH)}_2$ : -2650  
lattice enthalpy of  $\text{Mg(OH)}_2$ : -2995  
hydration energies:  $\text{Ba}^{2+}$ : -1360,  $\text{Ca}^{2+}$ : -1650,  $\text{Mg}^{2+}$ : -1920,  $\text{OH}^-$ : -460

Use your answers to explain the trend in solubility of the group (II) hydroxides.

3. Calculate the enthalpy of solution of silver chloride given the following data:  
Lattice enthalpy of silver chloride: -905  
Enthalpy of hydration of  $\text{Ag}^+$ : -464  
Enthalpy of hydration of  $\text{Cl}^-$ : -364

Explain why  $\text{AgCl}$  is much less soluble than  $\text{NaCl}$ .