

**Section A**

Answer **all** questions in the spaces provided.

**1** Thermodynamics can be used to investigate the changes that occur when substances such as calcium fluoride dissolve in water.

**1 (a)** Give the meaning of each of the following terms.

**1 (a) (i)** enthalpy of lattice formation for calcium fluoride

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(2 marks)

**1 (a) (ii)** enthalpy of hydration for fluoride ions

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(1 mark)

**1 (b)** Explain the interactions between water molecules and fluoride ions when the fluoride ions become hydrated.

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(2 marks)



1 (c) Consider the following data.

	$\Delta H^\ominus / \text{kJ mol}^{-1}$
Enthalpy of lattice formation for $\text{CaF}_2$	-2611
Enthalpy of hydration for $\text{Ca}^{2+}$ ions	-1650
Enthalpy of hydration for $\text{F}^-$ ions	-506

Use these data to calculate a value for the enthalpy of solution for  $\text{CaF}_2$

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(2 marks)

7

Turn over for the next question

Turn over ►

