2 The enthalpy of hydration for the chloride ion is –364 kJ mol^{-1} and that for the bromide ion is –335 kJ mol^{-1}.

2 (a) By describing the nature of the attractive forces involved, explain why the value for the enthalpy of hydration for the chloride ion is more negative than that for the bromide ion.

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(3 marks)

2 (b) The enthalpy of hydration for the potassium ion is –322 kJ mol^{-1}. The lattice enthalpy of dissociation for potassium bromide is +670 kJ mol^{-1}.

Calculate the enthalpy of solution for potassium bromide.

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(2 marks)

2 (c) The enthalpy of solution for potassium chloride is +17.2 kJ mol^{-1}.

2 (c) (i) Explain why the free-energy change for the dissolving of potassium chloride in water is negative, even though the enthalpy change is positive.

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(3 marks)

(Extra space) .....

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2 (c) (ii) A solution is formed when 5.00 g of potassium chloride are dissolved in 20.0 g of water. The initial temperature of the water is 298 K.

Calculate the final temperature of the solution.

In your calculation, assume that only the 20.0 g of water changes in temperature and that the specific heat capacity of water is 4.18 J K^{-1} g^{-1}.

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(5 marks)

13

Turn over ▶