

A level Chemistry A

H432/01 Periodic table, elements and physical chemistry

Question Set 9

1. (a) (i) This question is about enthalpy changes.

Table 16.1 shows enthalpy changes that can be used to determine the enthalpy change of hydration of fluoride ions, F^- .

Enthalpy change	Energy / kJ mol^{-1}
Hydration of Ca^{2+}	-1609
Solution of CaF_2	+13
Lattice enthalpy of CaF_2	-2630

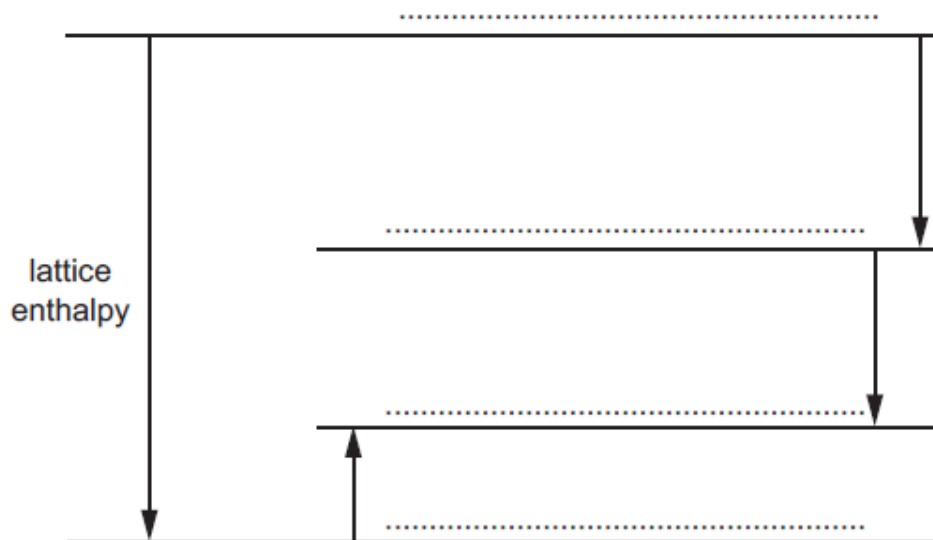
Table 16.1

Explain what is meant by the term *enthalpy change of hydration*.

[2]

(ii) The enthalpy change of hydration of F^- can be determined using the enthalpy changes in Table 16.1 and the incomplete energy cycle below.

On the dotted lines, add the species present, including state symbols.



[4]

(iii) Calculate the enthalpy change of hydration of fluoride ions, F^- .

enthalpy change of hydration = kJ mol^{-1}

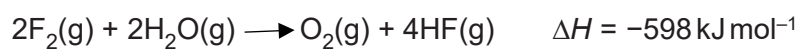
[2]

(iv) Predict how the enthalpy changes of hydration of F^- and Cl^- would differ.

Explain your answer.

[2]

(b) (i) Fluorine reacts with steam as shown in the equation below.



Average bond enthalpies are shown in the table.

Bond	Average bond enthalpy / kJ mol^{-1}
O–H	+464
O=O	+498
H–F	+568

Explain what is meant by the term *average bond enthalpy*.

[2]

(ii) Calculate the bond enthalpy of the F–F bond.

bond enthalpy = kJ mol^{-1} [3]

Total Marks for Question Set 9: 15

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