

[TP] Enthalpy of aquation, $\Delta_{aq}H$, is the enthalpy change when a mole of ion pairs, initially in the gas phase, so far apart they no longer interact with one another electrically, is place in liquid water. Enthalpy of aquation ...

33% 1. is always positive
33% 2. is always negative
33% 3. can be positive or negative, depending on the ionic solid

Response Counter

10

Lecture 11 CH102 A1 (MWF 9:05 am)

Wednesday, February 15, 2017

- $\Delta_{latt}H$, $\Delta_{aq}H$ and $\Delta_{soln}H$
- Predicting relative values of $\Delta_{latt}H$ and $\Delta_{aq}H$

Next: Complete ch12: Predicting relative values of $\Delta_{latt}H$ and $\Delta_{aq}H$; review: Colligative properties; begin ch13: Dynamic chemical equilibrium

Lattice enthalpy, $\Delta_{latt}H$

Write the chemical equation whose enthalpy change is the lattice enthalpy of KCl, $\Delta_{latt}H$. Be sure to include the states of all.

Lattice enthalpy, $\Delta_{latt}H$

Create the enthalpy diagram corresponding to the chemical equation whose enthalpy change is the lattice enthalpy of KCl, $\Delta_{latt}H$. Be sure to show visually whether the process is endothermic or exothermic.

[TP] Enthalpy of aquation, $\Delta_{aq}H$, is the enthalpy change when a mole of ion pairs, initially in the gas phase, so far apart they no longer interact with one another electrically, is place in liquid water. Enthalpy of aquation ...

33% 1. is always positive
33% 2. is always negative
33% 3. can be positive or negative, depending on the ionic solid

Response Counter

10

Enthalpy of aquation, $\Delta_{aq}H$

Write the chemical equation whose enthalpy change is the enthalpy of aquation of KCl, $\Delta_{aq}H$. Be sure to include the states of all species.

Enthalpy of aquation, $\Delta_{aq}H$

Create the enthalpy diagram corresponding to the chemical equation whose enthalpy change is the enthalpy of aquation of KCl, $\Delta_{aq}H$. Be sure to show visually whether the process is endothermic or exothermic.

[TP] Enthalpy change of solution, $\Delta_{sol}H$, is the enthalpy change when a mole of an ionic solid dissolves in water. Enthalpy of solution ...

33% 1. is always positive
33% 2. is always negative
33% 3. can be positive or negative, depending on the ionic solid

Response Counter

10

Enthalpy change of solution, $\Delta_{sol}H$

Write the chemical equation whose enthalpy change is the enthalpy change of solution of KCl, $\Delta_{sol}H$. Be sure to include the states of all species.

BOSTON UNIVERSITY 12

Enthalpy change of solution, $\Delta_{sol}H$

Create the enthalpy diagram corresponding to the chemical equation whose enthalpy change is the enthalpy change of solution of KCl, $\Delta_{sol}H$. Be sure to show visually whether the process is endothermic or exothermic.

BOSTON UNIVERSITY 13

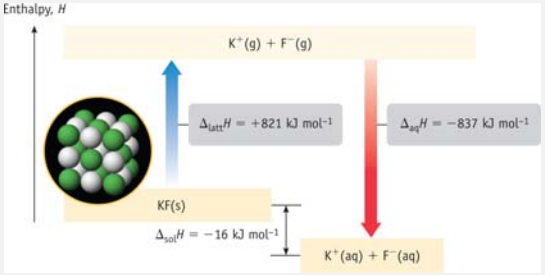
Enthalpy change of solution, $\Delta_{sol}H$

Combine the three enthalpy diagrams that you have created to visually related the lattice enthalpy, enthalpy of aquation and the enthalpy change of solution. Be sure to include the states of all species.

BOSTON UNIVERSITY 14

Enthalpy change of solution, $\Delta_{sol}H$

When KF(s) is dissolved in water in a beaker, the beaker becomes warm. Sketch the enthalpy change diagram for $\Delta_{sol}H$ in terms of $\Delta_{latt}H$ and $\Delta_{aq}H$.



BOSTON UNIVERSITY 15

[Quiz] When ammonium nitrate dissolves in water in a beaker, the beaker feels cold. The means that, relative to the magnitude of the enthalpy change of aquation, $|\Delta_{aq}H|$, the magnitude of the lattice enthalpy, $|\Delta_{latt}H|$ is ...

25% 1. larger
25% 2. the same
25% 3. smaller
25% 4. Further information required

Response Counter 10

Predicting relative values of $\Delta_{latt}H$ and $\Delta_{aq}H$

Lattice enthalpy, $\Delta_{latt}H$

Key idea: Electrical attraction (Coulomb's law) between oppositely charged ions in lattice

Energy $\propto \frac{q_+ q_-}{\text{separation}}$

The larger charges the greater lattice enthalpy

MgS > NaCl

$CaCO_3 > KNO_3$

Lattice enthalpy, $\Delta_{latt}H$

Key idea: Electrical attraction (Coulomb's law) between oppositely charged ions in lattice

Energy $\propto \frac{q_+ q_-}{\text{separation}}$

The smaller ion size, the smaller the separation and so ...

the greater lattice enthalpy

NaF > NaCl

LiCl > NaCl