OCR (B) Chemistry A-Level

O1- Energetics

Flashcards

What are the factors determining the relative solubility of a solute in aqueous and non-aqueous solvents?

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- Temperature
- Polarity i.e. ionic bonds, intermolecular bonds etc.
- Molecular size

What are hydrated ions?

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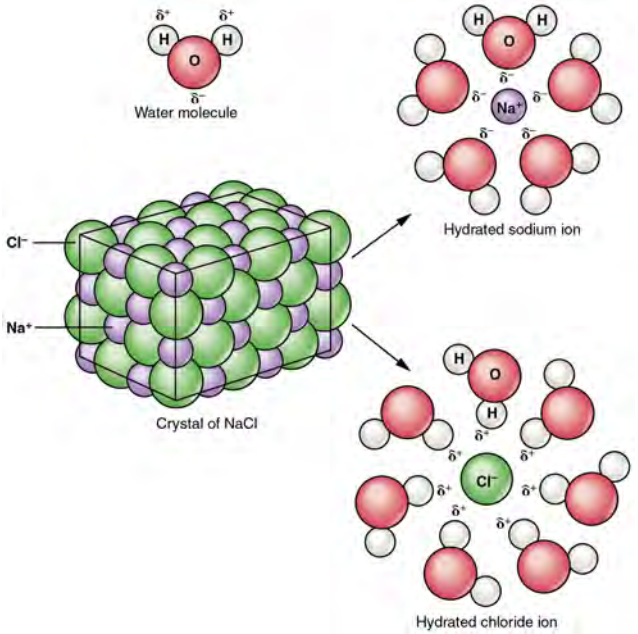
An ion surrounded by water molecules in a spherical-shaped shell.



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What is enthalpy change of solution?

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The enthalpy change that occurs when one mole of ionic solid dissolves in water to form one mole of aqueous ions, under standard conditions.

What is lattice enthalpy?

What is lattice enthalpy?

The enthalpy change when one mole of an ionic compound is formed from its gaseous ions, under standard conditions.

(Exothermic)

What is the enthalpy change of hydration of ions?

What is the enthalpy change of hydration of ions?

The enthalpy change when one mole of gaseous ions are completely hydrated by water to form one moles of aqueous ions, under standard conditions.

How are lattice enthalpy, enthalpy change of solution and enthalpy change of hydration related?

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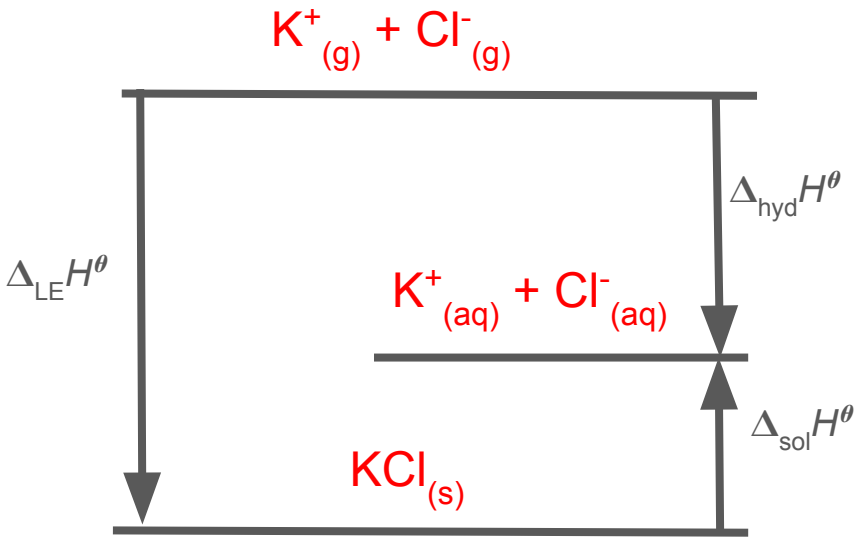

What is charge density?

What is charge density?

The charge per unit volume/surface area/length.

How are lattice enthalpy and enthalpy change of hydration affected by charge density of the ions?

How are lattice enthalpy and enthalpy change of hydration affected by charge density of the ions?

The greater the charge density of the ions:

- The more exothermic the lattice enthalpy due to increased electrostatic attraction.
- The more exothermic the hydration enthalpy due to increased attraction of water molecules.

What is entropy?

What is entropy?

It measures the number of ways that molecules and their associated energy quanta can be arranged; quite simply it is the measure of disorder in a system.

How can you predict whether entropy change is positive or negative?

How can you predict whether entropy change is positive or negative?

- Entropy increases from a solid to a liquid/aqueous to a gas. E.g. if a reaction causes a liquid and a solid to form a gas, then the entropy change is **positive**.
- If there are more gaseous products than reactants then entropy will increase and hence the change will be **positive**.

What is total entropy change equal to?

What is total entropy change equal to?

$$\Delta_{tot}S = \Delta_{sys}S + \Delta_{surr}S$$

(total entropy change = entropy change of the system + entropy change of the surroundings)

What is the entropy change of the surroundings equal to?

What is the entropy change of the surroundings equal to?

$\Delta_{surr}S = -\Delta H/T$

Where ΔH is the enthalpy change of the reaction and T is the temperature, in Kelvin.

When is a reaction feasible?

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When the total entropy change, $\Delta_{tot}S$ is positive.

How do you calculate the entropy change of the system (given the entropies of reactants and products)?

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$$\Delta S = \Sigma S^{\theta}_{products} - \Sigma S^{\theta}_{reactants}$$

- If ΔS is positive = more disordered
- If ΔS is negative = less disordered

What is solubility product?

What is solubility product?

- The solubility product constant, K_{sp}, is an equilibrium constant for a solid dissolving in (aqueous) solution.
- The higher its K_{sp}, the more soluble a substance is and hence the more solute that dissolves.

How do you calculate K_{sp}?

How do you calculate K_{sp}?

For reaction: $aA_{(s)} \rightleftharpoons cC_{(aq)} + dD_{(aq)}$

$K_{sp} = [C]^c[D]^d$

Solids are not included as their concentrations don't affect the expression and are hence insignificant.