

DEFINITION

Ionic bonding occurs between a metal and a non metal ion with the electrostatic attraction between the ions. The electron will leave the low electronegative metal and move to the high electronegative non-metal.

Characteristics

electrons placed inside the atoms

strong electrostatic bonds

no directional preference

high melting and boiling points

soluble in polar solvents (water, alcohols, ...)

WHY?

BECAUSE OF LATTICE ENERGY

it is the enthalpy of formation of the ionic compound from gaseous ions, the measurement of the bonds' strength

Type of ionic interactions

electrostatic (main interaction)

repulsive (between the electrons)

repulsive (between the nuclei)

Fomulae

For a mole of solid:
$$E_g = -NA \frac{|q_1||q_2|e^2}{4\pi\epsilon_0 d} \sum_{i=1}^{\infty} \frac{1}{r_i^2}$$

MADLUNG CONSTANT

- ✦ Depends on the relative position of the ions in the solid
- ✦ Is characteristic for each "structure"

Fomulae

$$U_{\text{lattice}} = E_{\text{attractive}} + E_{\text{repulsive}}$$

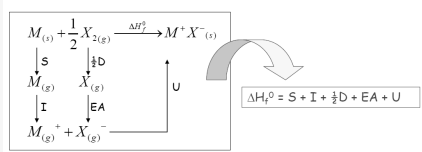
Born-Landé equation

$$U = -\frac{AN_A}{4\pi\epsilon_0} \frac{|Z_1||Z_2|e^2}{d} \left(1 - \frac{1}{n}\right)$$

Born-Haber Cycle

Lattice energy cannot be easily obtained experimentally	Thus , we apply the Hess Law to realize indirect calculations
standard enthalpy of formation	ΔH_f
enthalpy of sublimation	$\Delta H_s=S$
enthalpy of dissociation	$\Delta H_d=D$
ionization energy (take an electron)	$\Delta H_i=I$
electron affinity (add an electron)	$\Delta H_{EA}=EA$

Born-Haber Cycle



Ionic Liquids (IL)

Salts in liquid state at room temperature made of ions Possible when the ionic charges aren't too high and the distance is large enough

Useful properties

-non volatile	-remain in liquid state up to 400°C
-non flammable	-good solvents for reactions
-reduced volume	-easy reuse

Ionic Conductors (Superconductors)

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Not published yet.
 Last updated 18th November, 2024.
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