

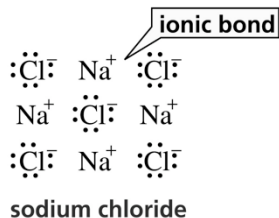
## Bonding & Molecular Shapes VSEPR

## Ionic & Covalent Bonds

- ▶ When a nonmetal and a metal form a compound: Valence electrons of the metal are lost and the nonmetal gains these electrons to achieve a Noble gas electron configuration and forming an Ionic Bond.
- ▶ When two nonmetals form a compound: They share electrons to achieve a Noble gas electron configuration and forming a Covalent Bond.

## Ionic Compounds

- Ionic compounds are formed when electron(s) are transferred.
- Electrons go from less electronegative element to the more electronegative forming ionic bonds.



## Bond Energy

- ⚡ It is the energy required to break a bond, i.e. overcome the force of attraction.
- ⚡ The quantitative value provides information about the strength and nature of the bond.

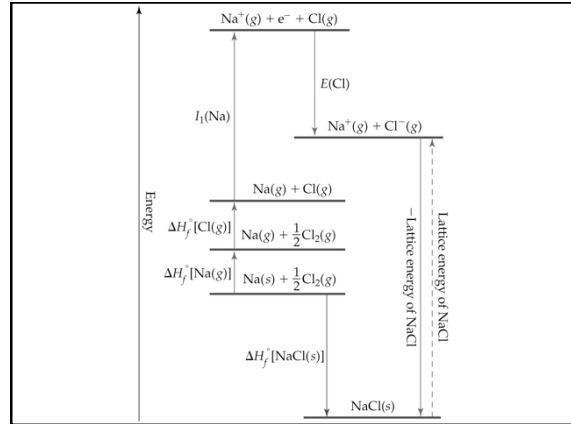
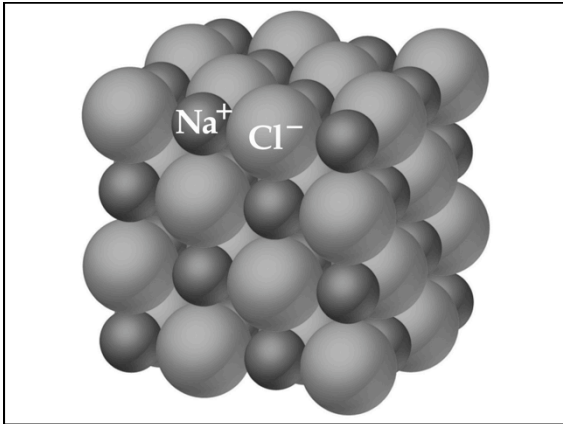
## Bond Energies

- ▶ Bond breaking requires energy (endothermic).
- ▶ Bond formation releases energy (exothermic).
- ▶  $\Delta H_{rxn} = \Sigma H(\text{bonds broken}) - \Sigma H(\text{bonds formed})$

## Lattice Energy

Hess's Law for ionic crystalline solids

- ▶ The change in energy when gaseous ions pack together to form an ionic solid.
 
$$M^+(g) + X^-(g) \rightarrow MX(s)$$
- ▶ Lattice energy is a negative value (exothermic).
- ▶ How can the Lattice energy be calculated?

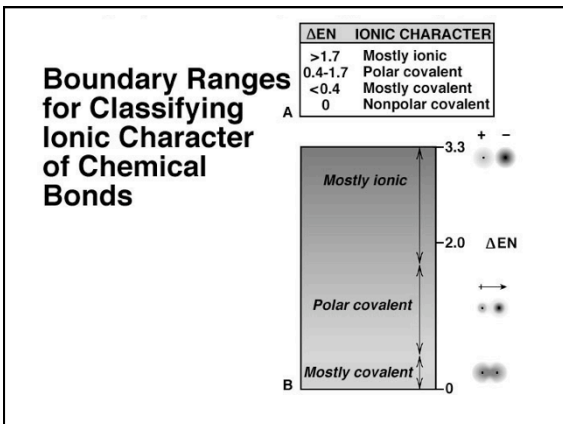


### Electronegativity

▶ The ability of an atom in a molecule to attract shared electrons to itself.

▶  $\Delta = (H - X)_{actual} - (H - X)_{expected}$

### Electronegativity



## QUESTION

Atoms having greatly differing electronegativities are expected to form:

- 1) no bonds.
- 2) polar covalent bonds.
- 3) nonpolar covalent bonds.
- 4) ionic bonds.
- 5) covalent bonds.

## ANSWER

D) ionic bonds.

If two atoms have greatly differing electronegativities the more electronegative atom will pull on the bonding electrons so strongly the electrons will transfer from one atom to the other.

### Covalent Bond Polarity

A molecule, such as HF, that has a center of positive charge and a center of negative charge is said to be polar, or to have a dipole moment.

