Chemistry

Unit 5 Ionic Bonds

Ionic Bonds - the attraction that holds oppositely charged particles together. When atoms bond, they want ZERO CHARGE

- **The number of cations and anions (charges) must be such that there is a net charge of Zero**

Metals want to lose electrons and nonmetals want to gain electrons

Bonds between metals and nonmetals are usually ionic

For example,

when elemental sodium (Na) and chlorine (Ca) are combines, chlorine takes one valence electron form sodium and forms 2 ions:

Na+ and Cl-

There is a strong bond between the positive and negative ions

K+ (potassium ion has a charge of 1+) and F- (flourine ion has a charge of 1-) so the ionic compound would be KF

Ca2+ (calcium ion has a charge of 2+) and Cl- (chlorine ion has a charge of 1-) so the ionic compound would be CaCl2

Polyatomic Ions - an ion made up of more than one atom

- units that cannot be broken apart

Mg2+ and OH-

Mg(OH)2

Nomenclature - naming

Type 1 - the charges on the ions can be determined simply by using the periodic table

1) name the cation first then the anion

2) change the ending of the anion to -ide

Examples:

MgCl2 Magnesium Chloride

Mgo Magnesium Oxide

Be3N2 Beryllium Nitride

Li2S Sodium Phosphide

Polyatomic ions

Don't change the name of the polyatomic ion in the end

Example:

$NaNO_3$ Sodium Nitrate

$CaCO_3$ Calcium Carbonate

Type 2 - the charge of the metal ion must be given

The metals in the transition block can have more than one charge as an ion

We indicate the charge in roman numeral I, II, III, IV, V, VI, VII, VIII, IX, X

1) name the cation first

2) change the ending of the anion to -ide

3) include the charge of the cation as a roman numeral (use the charge of the anion to determine the charge of the cation)

Example:

MnCl Manganese(I)Chloride

FeO Iron(II)Oxide

Fe_2O_3 Iron(III)Oxide

Breaking apart ions

Lattice energy - required to break ions

2 things

Smaller ions need more energy to break

- Smaller ions are closer together, harder to seperate

- Larger ions are futhers apart, easier to seperate

Larger charges also need more energy to break

- larger attraction is more difficult to break apart

-smaller attraction is easier to break

Transition temperatures follow the same trend energy

For Example:

Which has a greater boiling point

MgO or NaI

MgO becaue its charge is Mg2+ and O2-

Lewis Structure of Ionic Bonds