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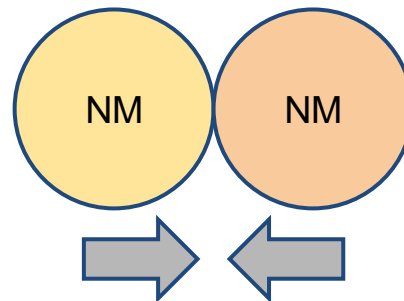
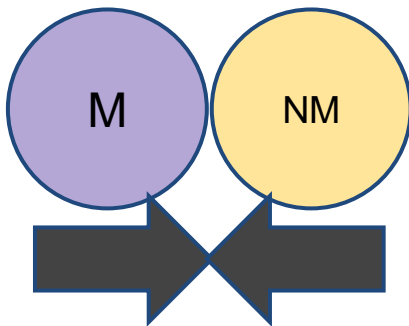
Bonding Review: Ionic and Molecular Compounds

Ionic compounds

Molecular compounds (covalent bonds)

Stronger/Weaker attraction
between ions/atoms to form
ionic compounds

Stronger/Weaker attraction
between ions/atoms to form
molecular compounds

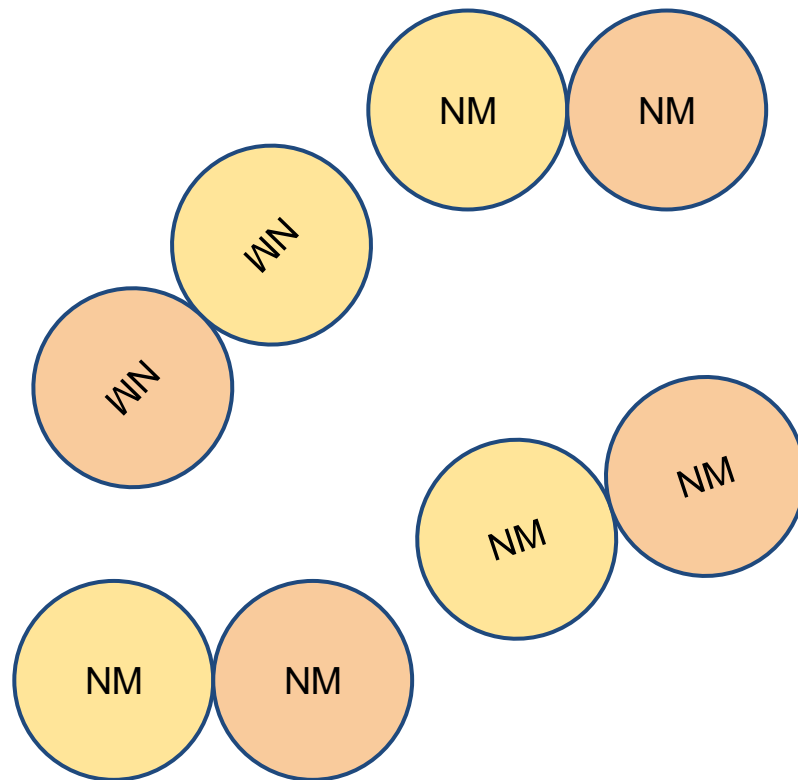
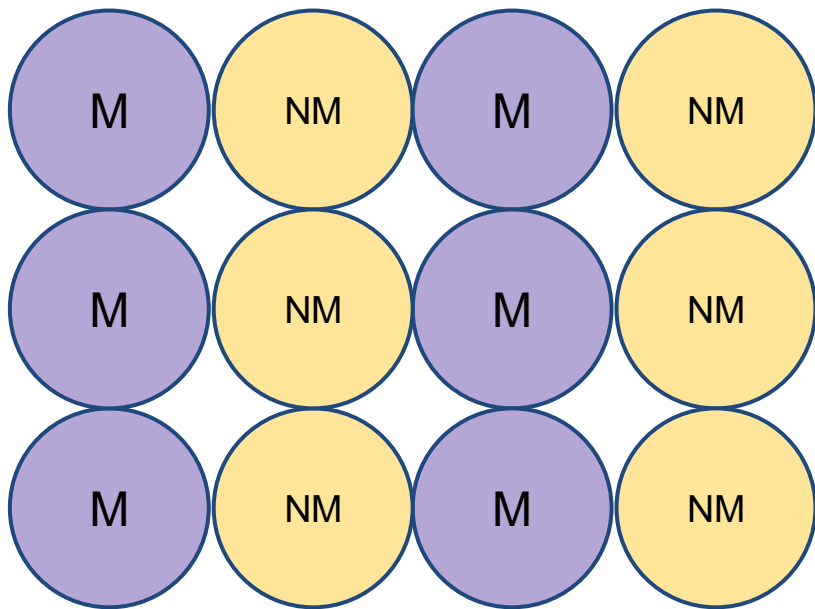


Ionic compounds

Molecular compounds (_____ bonds)

Separate molecules/Formula units (such as NaCl) all bond together/separately.

Separate molecules/Formula units are formed with ionic/covalent bonds holding them together



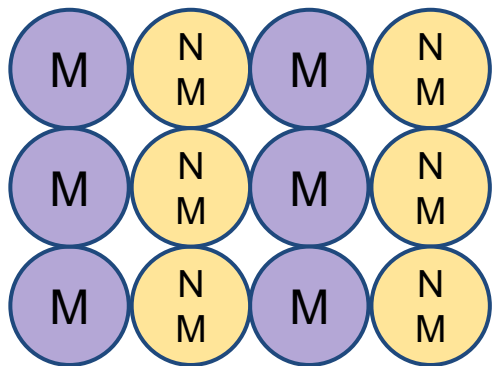
Ionic compounds

Molecular compounds
(_____ bonds)

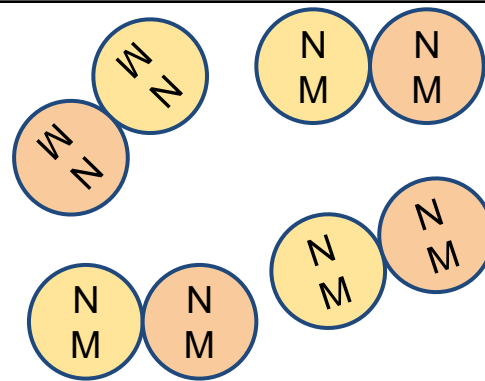
Lower/Higher melting and boiling points

Lower/Higher melting and boiling points

_____ → liquid → _____
increasing movement



Requires less/more energy
(higher/lower temp) to melt or boil



Requires less/more energy
(higher/lower temp) to melt or boil

Ionic compounds

Ionic compounds conduct _____ when dissolved in water or molten

because _____ (charged particles) are free to move

Molecular compounds (_____ bonds)

Do not conduct _____ as solids, dissolved particles, or in molten state

(no ions to move)

Molecular solids are hard/soft.

1. As a bond between a hydrogen atom and a sulfur atom is formed, electrons are

- (1) shared to form an ionic bond
- (2) shared to form a covalent bond
- (3) transferred to form an ionic bond
- (4) transferred to form a covalent bond

2. Which statement describes the composition of potassium chlorate, KClO_3 ?

- (1) The proportion by mass of elements combined in potassium chlorate is fixed.
- (2) The proportion by mass of elements combined in potassium chlorate varies.
- (3) Potassium chlorate is composed of four elements.
- (4) Potassium chlorate is composed of five elements.

3. Which characteristic is a property of molecular substances?

- (1) good heat conductivity
- (2) good electrical conductivity
- (3) low melting point
- (4) high melting point

4. Which compound does not dissolve in water to form an aqueous solution that can conduct an electric current?

(1) NaOH

(2) Ba(OH)₂

(3) Ca(OH)₂

(4) CH₃OH

5. Which compound contains both ionic and covalent bonds?

(1) ammonia

(2) methane

(3) sodium nitrate

(4) potassium chloride

Polar molecules have both:

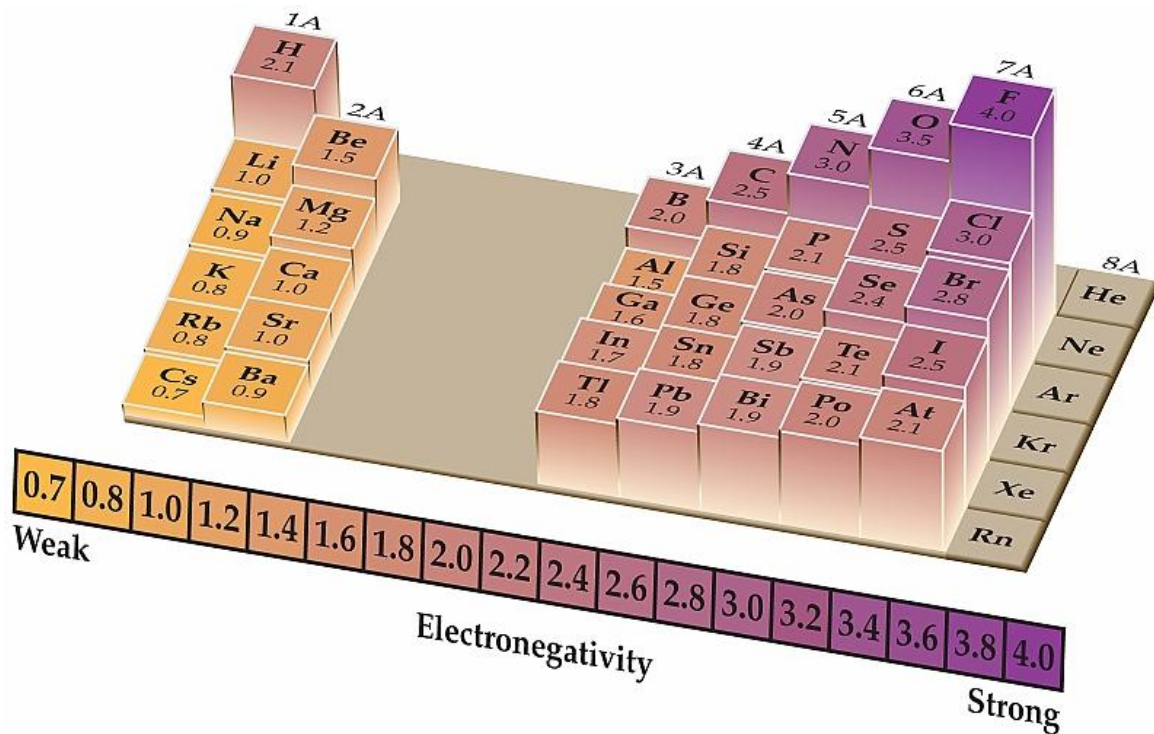
1. _____ bonds (Determined by electronegativity)

2. Overall symmetry/asymmetry

Polar molecules are ionic/molecular compounds with _____ bonds between atoms

Electronegativity: tendency of an atom to attract a bonding pair of electrons.

Electronegativity values are found in of the reference table



More protons moving _____ to _____ = more “pull” on electrons

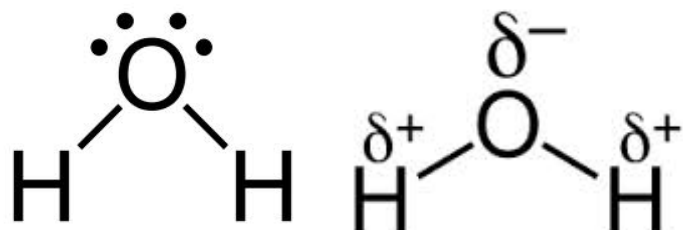
Fewer electron shells _____ to _____ = more “pull” on electrons

SUMMARY: Polarity and Bond Type

Polar Covalent Molecules

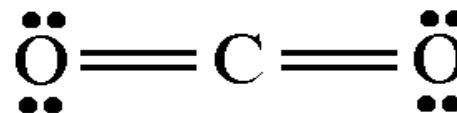
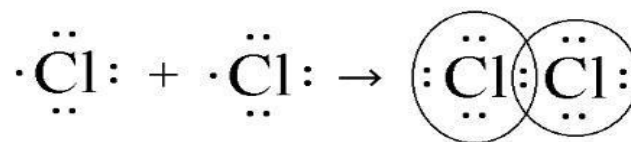
- asymmetrical with polar bonds
- equal/unequal distribution of electrons and charge
- dipole =

- EN difference between _____ and _____



Nonpolar Covalent Molecules

- symmetrical or nonpolar bonds
- equal/unequal distribution of electrons and charge
- EN difference between _____ and _____



6. Which element has an atom with the greatest attraction for electrons in a chemical bond?

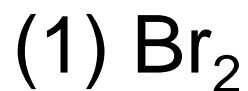
(1) As

(2) Bi

(3) N

(4) P

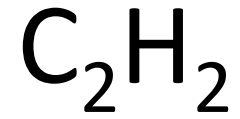
7. Which formula represents a polar molecule?



(Hint: drawing Lewis dot diagrams will help you answer this question)

8. Draw a Lewis dot diagram for
tin (IV) oxide

9. Draw a Lewis dot diagram for



Ionic Bonding: Writing Chemical formulas

Criss Cross Method: ions to chemical formula

1. Write symbols and charges of ions.

2. Crisscross:

The anion/cation (+) charge becomes the anion subscript

The anion/cation (-) charge becomes the cation subscript

3. Final format for ionic formulas

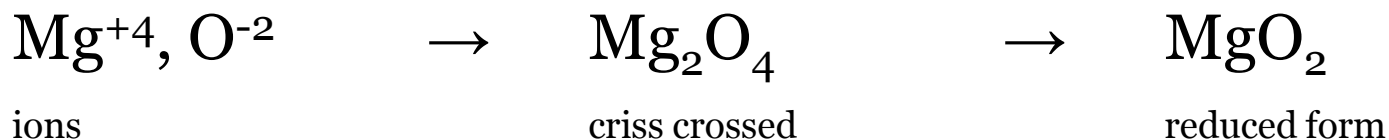
-Do/Don't write ionic charges

-reduce _____ to lowest ratio

-do NOT write the subscript “___”

-For polyatomic ions, parenthesis may be needed to separate two different subscripts.

Example:

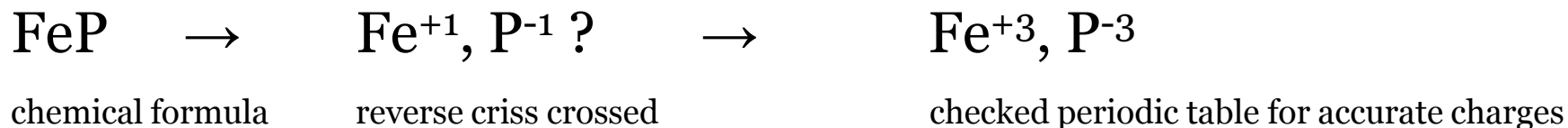


Ionic Bonding: Writing Chemical formulas

Reverse Criss Cross: chemical formula to ions

1. Reverse criss cross the chemical formula's subscripts to determine each element's charge.
2. Break up the formula into its ions. Be sure to write in the charges used.
 - + for the metal/nonmetal (1st element)
 - for the metal/nonmetal (2nd element)
3. Double check these charges with the periodic table because the charges from reverse criss crossing may not exist for those elements due to the chemical formulas being _____.

Example:



Rules for Naming Ionic Compounds

★ Metals keep their name.

★ When the metals have more than one _____ number (charge in the right hand corner of the periodic table), you must make note of this in the name using a _____ (I, II, III, _____, _____, _____, etc).

- Example: Mn^{+2} --> Mn (II)

Mn^{+4} --> Mn (IV)

★ Non-metals keep the first syllable and change the ending to – _____.

- Example: _____ --> Oxide

★ Polyatomic ions can be found in Table ___ and always keep their names. PAI's with positive/negative charges act as the metal and PAI's with positive/negative charges act as the nonmetal.

Naming Ionic Compounds

#	IONS	CHEMICAL FORMULA	CHEMICAL NAME
10.			Barium Iodide
11.		Mn_2O_7	
12.			Cobalt (III) phosphide
13.	$\text{NH}_4^+, \text{S}^{-2}$		

Rules for Naming Molecular Compounds

- ★ Name the elements in the order they are listed in the chemical formula.
- ★ For how many atoms that each molecule has, add the prefix of that element. (example: _____=1, _____=2, _____=3, _____=4, _____=5, _____=6, _____=7, _____=8, _____=9, _____=10)
- ★ First nonmetal with only one atom *does not* have “_____” in name.
- ★ First/Second nonmetal keeps its name and needs prefix if it has more than one atom.
- ★ Second nonmetal always/sometimes/never has a prefix.
- ★ Second nonmetal ends in –_____.

Naming Molecular Compounds

#	CHEMICAL FORMULA	CHEMICAL NAME	POLAR OR NONPOLAR MOLECULE?
14.		dinitrogen tetrahydride	
15.	CBr_4		
16.		sulfur hexachloride	
17.	SiO_2		