Key

Unit 2 Test Review: Matter, Bonding, & Nomenclature

Matter

- Physical and Chemical Properties and Changes

1. Determine if the following are physical properties/changes or chemical properties/changes.
   a. Melting point P
   b. Ability of rust C
   c. Density P
   d. Transparency P
   e. Glass breaking P
   f. A rusting bicycle C
   g. Frying an egg C
   h. Squeezing oranges for juice P
   i. Mixing salt and water P
   j. Cutting the grass P
   k. Fireworks exploding C
   l. Boiling water P

- Pure Substances vs. Mixtures

2. What are 2 types of pure substances and how do they differ from each other?
   - elements - one type of matter
   - compounds - two or types of matter chemically bonded together
3. What are 2 types of mixtures and how do they differ from each other?
   - solutions (homogeneous mixtures) - physical blend of 2 or more substances that looks consistent (Ex. coffee, milk)
   - heterogeneous mixture - same as solution except you can see each component (Ex. pepperoni pizza)
4. Identify the following as being an element (E), compound (C), homogeneous mixture (S), or heterogeneous mixture (HM).
   a. Air S (mixture of nitrogen, oxygen, & argon)
   b. Rust (Fe_2O_3) C
   c. Platinum (Pt) E
   d. Vegetable soup HM
   e. Brass S (mixture of copper & tin)
   g. Concrete HM
   h. Iron (Fe) E
   i. Tea S
   j. Raw egg HM

- Kinetic Molecular Theory and States of Matter

5. What are the 4 states of matter and how are they different from each other in terms of…

	Solid	Liquid	Gas	Plasma
a. Particles	tightly packed	closely packed	far apart	very far apart
b. Movement	vibrate in position	slide past eachother	fast & random	very fast & random
c. Speed of particles	slowest →			fastest
d. Kinetic energy	least →			most

6. What is it called when…

a. A solid becomes a liquid? melting

b. A gas becomes a liquid? condensing

c. A gas becomes a plasma? ionizing

d. A liquid becomes a solid? freezing

e. A solid becomes a gas without being a liquid? sublimating

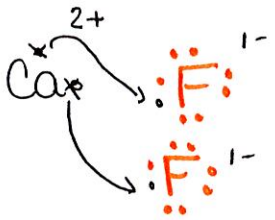
f. A liquid becomes a gas? vaporizing

g. A plasma becomes a gas? deionizing

h. A gas becomes a solid without being a liquid? deposition

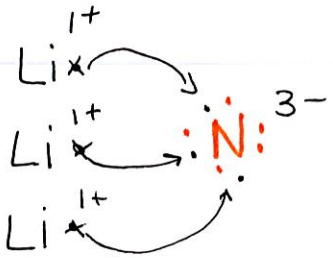
Bonding

7. Ionic Bonds
   a. Occurs between a metal & a nonmetal
   b. When electrons (e^-) are transferred from the metal to the nonmetal
   c. Ionic compound properties
      1. solids @ room temperature
      2. conduct electricity when melted or in solution
      3. high melting & boiling points
   d. Electron Dot Diagrams
      1. Ca & F



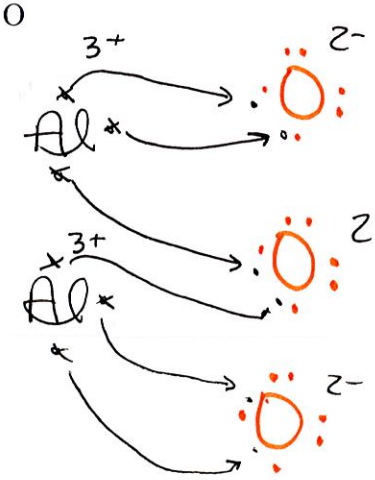
CaF_2

      2. Li & N



Li_3N

      3. Al & O



Al_2O_3

8. Covalent Bonds

a. Occurs between a nonmetal & a nonmetal

b. When electrons (e^-) are shared

c. Covalent Compound Properties

4. low heats of fusion & vaporization

1. low melting & boiling points
2. insulators (nonconductors)
3. brittle solids

ii. Polarity – difference in electronegativities

Electronegativity Difference:
Pure Covalent: below 0.4
Polar Covalent: 0.4 – 1.7
Ionic: above 1.7

use the electronegativities on your pink periodic table

1. HCl — 1. 3.0 − 2.1 = 0.9 (polar)
2. CO — 2. 3.5 − 2.5 = 1.0 (polar)
3. $CaCl_2$ — 3. 3.0 − 1.0 = 2.0 (ionic)
4. H_2O — 4. 3.5 − 2.1 = 1.4 (polar)
5. P_2S_5 — 5. 2.5 − 2.1 = 0.4 (pure)

9. Lewis Structures: Show how valence e^- are shared between two atoms.

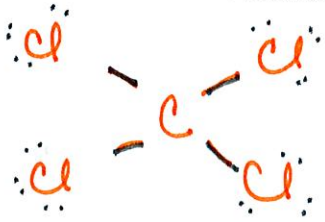
a. CCl_4

$1(4e^-) + 4(7e^-)$

$4e^- + 28e^- = 32e^-$

$\frac{32e^-}{2}$

= 16 prs. − 4 b. prs = 12 lone prs



b. H_2S

$2(1e^-) + 1(6e^-)$

$2e^- + 6e^- = 8e^-$

$\frac{8e^-}{2}$

= 4 prs. − 2 b. prs = 2 lone prs

c. CO_2

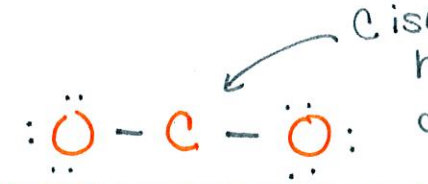
$1(4e^-) + 2(6e^-)$

$4e^- + 12e^- = 16e^-$

$\frac{16e^-}{2}$

= 8 prs − 2 prs = 6 prs

C isn't stable (doesn't have 4 prs), need to have double or triple bonds



$1(5e^-) + 3(7e^-)$

$5e^- + 21e^-$

$= 26e^-$

$\frac{26e^-}{2} = 13$ prs

-3 b. prs

10 lone prs

d. NF_3

$2(4e^-) + 2(1e^-)$

$8e^- + 2e^-$

$= 10e^-$

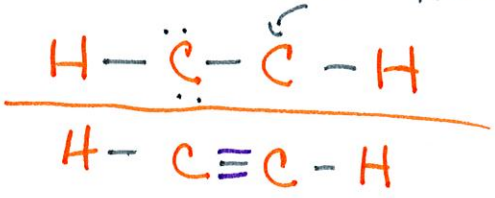
$\frac{10e^-}{2} = 5$ prs.

-3 b prs

2 lone prs

e. C_2H_2

C is not stable, need double or triple bonds



$1(6e^-) + 2(6e^-)$

$6e^- + 12e^-$

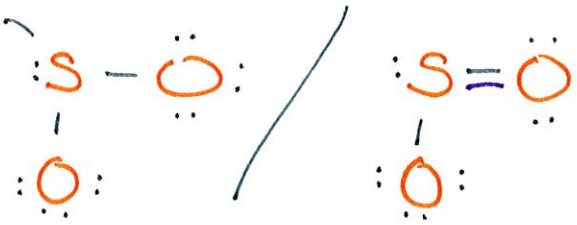
$\frac{18e^-}{2} = 9$ prs

-2 b. prs

$= 7$ lone prs

f. SO_2

S isn't stable



Nomenclature

10. How do you know what type of compound it is?

Type I Binary Regular metal + nonmetal	**Type II Binary** Transition metal + nonmetal or polyatomic ion Name has Roman Numerals	**Type III** 2 nonmetals Name uses prefixes	**Binary Acid** Hydrogen + anion without Oxygen Name has hydro------ic acid
Type I Tertiary Regular metal + polyatomic ion	**Type II Tertiary** Regular metal + polyatomic ion Name has Roman Numerals		**Oxyacid** Hydrogen + polyatomic ion with Oxygen Name is ------ic acid or ------ous acid

Nomenclature

(1) carbon tetrachloride - type III CCl_4

(2) mercury (II) oxide - type II $Hg^{2+}\ O^{2-} \Rightarrow HgO$

(3) potassium chlorate - type I $K^{1+}\ ClO_3^{1-} \Rightarrow KClO_3$

(5) hydrobromic acid - binary acid $H^{1+}\ Br^{1-} \Rightarrow HBr$

(6) copper (I) dichromate - type II $Cu^{1+}\ Cr_2O_7^{2-} \Rightarrow Cu_2Cr_2O_7$

(7) boron trifluoride - type III BF_3

(8) phosphorous (ite) acid - oxyacid $H^{1+}\ PO_3^{3-} \Rightarrow H_3PO_3$

(9) aluminum sulfate - type I $Al^{3+}\ SO_4^{2-} \Rightarrow Al_2(SO_4)_3$

(10) copper (II) nitrate - type II $Cu^{2+}\ NO_3^{1-} \Rightarrow Cu(NO_3)_2$

(11) sodium phosphate - type I $Na^{1+}\ PO_4^{3-} \Rightarrow Na_3PO_4$

(12) mercury (II) nitrate - type II $Hg^{2+}\ NO_3^{1-} \Rightarrow Hg(NO_3)_2$

(13) aluminum hydroxide - type I $Al^{3+}\ OH^{1-} \Rightarrow Al(OH)_3$

(14) sulfuric (ate) acid - oxyacid $H^{+}\ SO_4^{2-} \Rightarrow H_2SO_4$

(15) lead (II) carbonate - type II $Pb^{2+}\ CO_3^{2-} \Rightarrow PbCO_3$

(16) sodium thiocyanate - type I $Na^{1+}\ SCN^{1-} \Rightarrow NaSCN$

(17) silicon dioxide - type III SiO_2

(18) barium chloride - type I $Ba^{2+}\ Cl^{1-} \Rightarrow BaCl_2$

(19) nickel (II) phosphate - type II $Ni^{2+}\ PO_4^{3-} \Rightarrow Ni_3(PO_4)_2$

(20) copper (I) acetate - type II $Cu^{1+}\ C_2H_3O_2^{1-} \Rightarrow CuC_2H_3O_2$

(21) chlorous acid (-ite) - oxyacid $H^{1+}\ ClO_2^{1-} \Rightarrow HClO_2$

(22) iodine pentafluoride - type III IF_5

(23) tin (IV) sulfate - type II $Sn^{4+}\ SO_4^{2-} \Rightarrow Sn(SO_4)_2$

(24) chromium (II) oxide - type II $Cr^{2+}\ O^{2-} \Rightarrow CrO$

(25) lithium iodide - type I $Li^{1+}\ I^{1-} \Rightarrow LiI$

(26) $Cu^{2+}\ CO_3^{2-}$ (Cu: transition metal) - type II copper (II) carbonate

(27) Li_2S (Li: metal) - type I lithium sulfide

(28) HI (acid, no O) - binary acid hydroiodic acid

(29) $Tl(NO_3)_3$ (Tl: metal) - type I thallium nitrate

(30) NH_4NO_3 - type I ammonium nitrate

(31) $Cu^{2+}(ClO_4^{-1})_2^{-2}$ (Cu: transition metal) - type II copper (II) perchlorate

(32) H_3PO_4 (acid - has O) - oxyacid PO_4 is phosphate $\Rightarrow$ phosphoric acid

(33) S_2O_5 (nonmetals) - type III diphosphorous pentoxide

(34) $Rb_2Cr_2O_7$ (Rb: metal) - type I rubidium dichromate

(35) $KMnO_4$ (K: metal) - type I potassium permanganate

(36) $Cu^{2+}(NO_3^{-1})_2^{-2}$ (Cu: transition metals) - type II copper (II) nitrate

(37) $Ni(OH)_2$ (Ni: transition metal) - type II nickel (II) hydroxide

(38) $XeCl_2$ (nonmetals) - type III xenon dichloride

(39) $(NH_4)_2SO_4$ - type I ammonium sulfate

(40) $PbCl_2$ (Pb: transition metal) - type II lead (II) chloride

(41) HCN (acid - no O) - binary acid hydrocyanic acid

(42) $Fe_3(PO_4)_2$ — transition metal — type II — iron (II) phosphate

(43) $AgNO_3$ — transition metal — type II — silver (I) nitrate

(44) $HClO_3$ — acid w/ O — oxyacid — ClO_3 is chlorate ⇒ chloric acid

(45) N_2O_5 — nonmetals — type III — dinitrogen pentoxide

(46) $AlCl_3$ — metal — type I — aluminum chloride

(47) $TiCl_4$ — transition metal — type II — titanium (IV) chloride

(48) $Cr_2(SO_3)_3$ — transition metal — type III — chromium (III) sulfate

(49) KOH — metal — type I — potassium hydroxide

(50) CBr_4 — nonmetals — type III — carbon tetrabromide