Key

Unit 3 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?

1. elements - only 1 type of atom
2. compounds - 2 or more elements chemically bonded together

3. What are 2 types of mixtures and how do they differ from each other?

1. homogeneous mixtures (solutions) - 2 or more substances that are physically blended, looks uniform
2. heterogeneous mixtures - same as homogeneous except you can see each component

4. Identify the following as being an element (E), compound (C), homogeneous mixture (S), or heterogeneous mixture (HM).
   a. Air S
   b. Rust (Fe_2O_3) C
   c. Platinum (Pt) E
   d. Vegetable soup HM
   e. Brass S
   g. Concrete HM
   h. Iron (Fe) E
   i. Tea S
   j. Raw egg HM

- Kinetic Molecular Theory and States of Matter

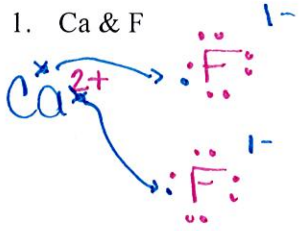
5. What are the 4 states of matter and how are they different from each other in terms of...

	Solid	Liquid	Gas	Plasma
a. Particles	tightly packed together	very close together	far apart	very far apart
b. Movement	vibrate in position	slide past each other	randomly	randomly

	Solid	Liquid	Gas	Plasma
c. Speed of particles	slowest ←			→ fastest
d. Kinetic energy	least ←			→ most

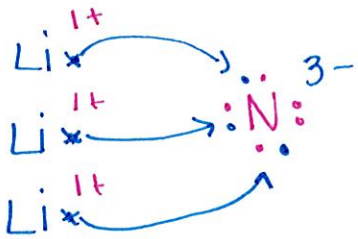
Bonding

6. Ionic Bonds
   a. Occurs between metals & nonmetals
   b. When electrons (e^-) are transferred
   c. Ionic compound properties
      1. . form crystals
      2. . high melting & boiling points
      3. . conductors if molten or in solution
   d. Electron Dot Diagrams
      1. Ca & F



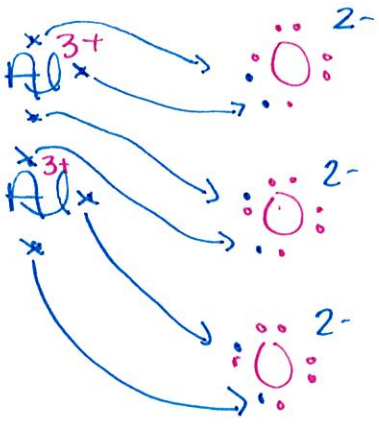
CaF_2

      2. Li & N



Li_3N

      3. Al & O



Al_2O_3

7. Covalent Bonds

a. Occurs between a nonmetal & a nonmetal

b. When electrons (e^-) are shared

c. Covalent Compound Properties

1. low melting & boiling points
2. insulators, not conductors
3. do not form crystals

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

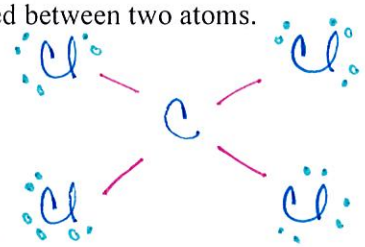
a. CCl_4

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

$4e^- + 28e^-$

$32e^- / 2 = 16$ pairs e^-

-4 b. prs $= 12$ Lone prs.



b. H_2S

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

$2e^- + 6e^-$

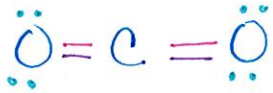
$8e^- / 2 = 4$ prs. e^- -2 b. prs. $= 2$ Lone prs.

c. CO_2

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

$4e^- + 12e^-$

$16e^- / 2 = 8$ prs. e^- -2 b. prs $= 6$ Lone prs



d. NF_3

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

$5e^- + 21e^-$

$26e^- / 2 = 13$ prs e^- -3 b. prs $= 10$ Lone prs

e. OF_2

$1(6e^-) + 2(7e^-)$

$6e^- + 14e^-$

$20e^- / 2 = 10$ prs e^- -2 b. prs $= 8$ Lone prs

f. SO_2

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

$6e^- + 12e^-$

$18e^- / 2 = 9$ prs e^-

-2 b. prs

7 Lone prs

10. Intermolecular Forces (IMFs)

a. What are the 3 types of IMFs? Describe each in terms of what they are and their strength compared to each other.

1. H Bonding - when a N, O, or F on 1 molecule weakly bonds to the H on another molecule (strongest IMF)
2. dipole-dipole - when 2 poles develop in a molecule due to a difference in electronegativity higher than .4
3. London dispersion force - tempory attraction between 2 molecules due to shifting e⁻. (weakest IMF)

b. How are IMFs different than intramolecular bonds, such as ionic and covalent bonds?

IMFs are very weak forces of attraction between molecules while intramolecular forces are strong attractions within a single molecule

c. The type of bonds or intermolecular forces that molecules undergo can affect the physical properties of substances such as melting point.

i. Identify the bond or force in each molecule, and

ii. Rank them from highest melting point to lowest melting point.

iii. If you needed to keep a newly developed ceramic material at low temperatures, which of these 4 substances would you keep it submerged in?

(i) (ii) (iii)

1. CH_4 - LDF
2. CBr_4 - LDF

> lowest mp. > one of these 2

3. NaBr - ionic - highest mp
4. CH_3OH - H bond - middle mp.

Nomenclature

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

Type I Binary Regular metal + nonmetal	**Type II Binary** Transition metal + nonmetal Name has Roman Numerals	**Type III** 2 nonmetals Name uses prefixes	**Binary Acid** Hydrogen + anion NO Oxygen Name has hydro------ic acid
Type I Tertiary Regular metal + polyatomic ion	**Type II Tertiary** transition metal + polyatomic ion Name has Roman Numerals		**Oxyacid** Hydrogen + polyatomic ion with Oxygen Name is ------ic acid or ------ous acid

NOMENCLATURE - MIXED REVIEW

1. carbon tetrachloride CCl_4
2. mercury(II) oxide HgO
3. potassium chlorate $KClO3$
4. hydrobromic acid HBr
5. sodium hydroxide $NaOH$
6. copper(I) dichromate $Cu_2Cr_2O_7$
7. boron trifluoride BF_3
8. phosphorous acid H_3PO_3
9. aluminum sulfate $Al_2(SO_4)_3$
10. copper(II) nitrate $Cu(NO3)2$
11. sodium phosphate $Na3PO4$
12. mercury(II) nitrate $Hg(NO3)2$
13. aluminum hydroxide $Al(OH)_3$
14. sulfuric acid H_2SO_4
15. lead (II) carbonate $PbCO3$
16. sodium chromate Na_2CrO_4
17. silicon dioxide SiO_2
18. barium chloride $BaCl_2$
19. nickel(II) phosphate $Ni_3(PO_4)_2$
26. $CaCO_3$ calcium carbonate
27. Li_2S lithium sulfide
28. HI hydroiodic acid
29. $Tl(NO_3)_3$ thallium nitrate
30. NH_4NO_3 ammonium nitrate
31. $Cu(ClO_4)_2$ copper(II) perchlorate
32. H_3PO_4 phosphoric acid
33. S_2O_5 disulfur pentoxide
34. $Rb_2Cr_2O_7$ rubidium dichromate
35. KMnO4 potassium permanganate
36. $Cu(NO_3)_2$ copper(II) nitrate
37. $Ni(OH)_2$ nickel(II) hydroxide
38. $XeCl_2$ xenon dichloride
39. $(NH_4)_2SO_4$ ammonium sulfate
40. $PbCl_2$ lead(II) chloride
41. HCN hydrocyanic acid
42. $Fe_3(PO_4)_2$ iron(II) phosphate
43. $AgNO_3$ silver(I) nitrate
44. $HClO_3$ chloric acid

20. copper(I) acetate CuC2H3O2

21. chlorous acid HClO2.

22. iodine pentafluoride IF5

23. tin(IV) sulfate Sn(SO4)2

24. chromium(II) oxide CrO

25. lithium iodide LiI

45. N_2O_5 dinitrogen pentoxide

46. $AlCl_3$ aluminum chloride

47. $TiCl_4$ titanium (IV) chloride

48. $Cr_2(SO_3)_3$ chromium (III) sulfite

49. KOH potassium hydroxide

50. CBr_4 carbon tetrabromide