

UNIT TEST REVIEW – COVALENT BONDS - K

KEY

Electronegativity Chart

H 2.1																			
Li 1.0	Be 1.5														B 2.0	C 2.5	N 3.0	O 3.5	F 4.0
Na 0.9	Mg 1.2														Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.9	Ni 1.9	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8			
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5			
Cs 0.7	Ba 0.9	La-Lu 1.0-1.2	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Tl 1.8	Pb 1.9	Bi 1.9	Po 2.0	At 2.2			
Fr 0.7	Ra 0.9	Ac 1.1	Th 1.3	Pa 1.4	U 1.4	Np-No 1.4-1.3													

1. What is the electronegativity difference for the following compounds? Are they Ionic, Non-Polar Covalent, or Polar Covalent? Show work in big box, Write I, PC, NPC in small box.

a. Sodium and Flourine

Na-0.9
F-4.0 $4.0-0.9=3.1$

I

b. Sodium and Chlorine

Na-0.9
Cl-3.0 $3.0-0.9=2.1$

I

c. Carbon and Oxygen

C-2.5
O-3.5 $3.5-2.5=1.0$

PC

d. Nitrogen and Chlorine

N-3.0
Cl-3.0 $3.0-3.0=0$

NPC

e. Phosphorus and Iodine

P-2.1
I-2.4 $2.4-2.1=0.3$

NPC

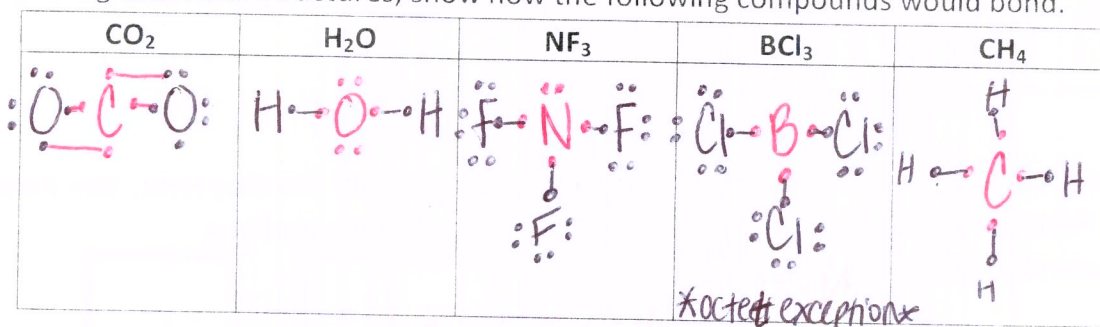
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2. List the properties of a covalent bond

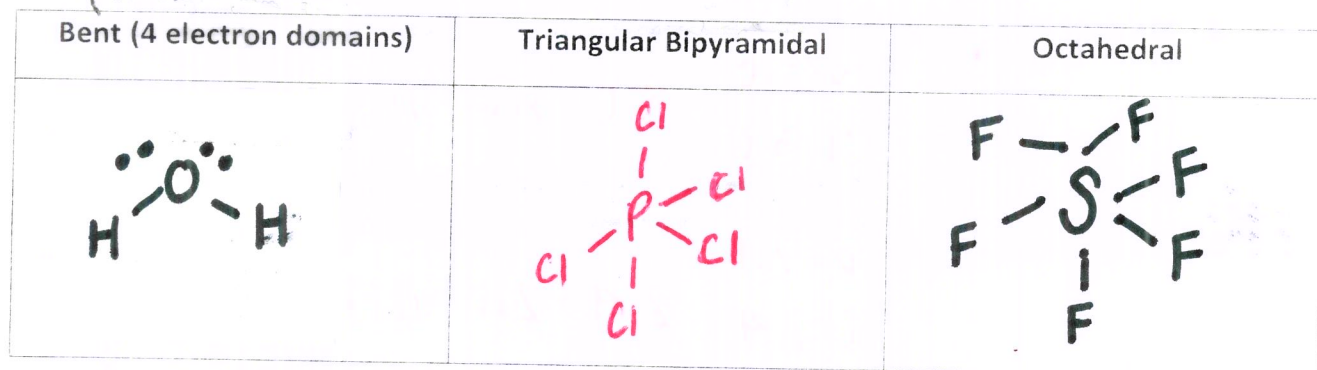
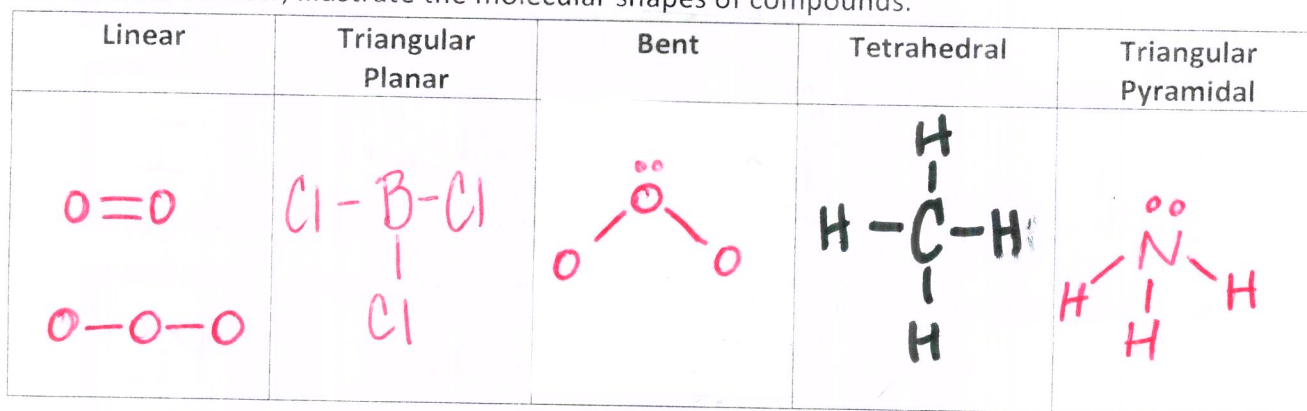
- a. LOW Melting & boiling point
- b. donot dissolve in water
- c. donot conduct electricity
- d. usually gas @ room Temp
- e. LOW EN difference
- f. flammable
- g. MOLECULE
- h. shared electrons
nonmetals

Remind them
of card sort!

3. Using Lewis Dot Structures, show how the following compounds would bond.



4. In the boxes below, illustrate the molecular shapes of compounds.



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5. Using the VSEPR Theory, fill in the empty boxes for determining the shapes molecules.

Electron Domains	BONDED Pairs	LONE Pairs	Molecular Shape
2	2	0	Linear
3	3	0	Triangular Planar
3	2	1	Bent
4	4	0	Tetrahedral
4	3	1	Triangular Pyramidal
4	2	2	Bent
5	5	0	Triangular bipyramidal
6	6	0	Octahedral

6. Write the name for the following compounds. There are IONIC and COVALENT Compounds listed.

- C a. N_2O_5 Dinitrogen Pentoxide
- I b. BCl_3 Boron Chloride
- C c. H_2O Water!
- I d. $MgCl_2$ Magnesium Chloride
- C e. CCl_4 Carbon tetrachloride
- I f. KBr Potassium Bromide
- AQ g. HCl Hydrochloric Acid
- A h. $HClO_3$ Chloric Acid
- C i. XeF_4 Xenon tetrafluoride
- C j. PCl_5 Phosphorous Pentachloride
- C k. NI Nitrogen moniodide

7. Write the formula's for the following compounds. There are IONIC and COVALENT compounds listed.

- a. Chlorine monoxide ClO
- b. Oxygen difluoride OF₂

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- c. Water H₂O
- d. Methane CH₄
- e. Glucose C₆H₁₂O₆
- f. Carbon Dioxide CO₂
- g. Carbon Monoxide CO
- h. Carbon Tetrachloride CCl₄

8. What does VSEPR stand for?

Valence shell electron pair Repulsion

9. List the elements that are considered DIATOMIC ELEMENTS. (There's 7 of them.)

H O F Br I N Cl

10. If an atom has a charge, what is it called?

ION (Polyatomic's are ions too! - CO₃²⁻)

11. List the prefixes and the number the prefix corresponds to

Mono	1
di	2
tri	3
tetra	4
penta	5
hexa	6
hepta	7
octa	8
non	9
deca	10

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12. What range of electronegativity differences do Polar covalent and Non-Polar covalent bonds fall in?

a. Polar – 0.5 - 1.69

b. Non-Polar – 0.0 - 0.49

13. If an atom is Polar, how do you know which atom the electron spends more time with?

the atom with the higher Electronegativity value

14. If IONIC is to FORMULA UNIT, COVALENT is to MOLECULE

15. When atoms bond, which particle is involved in the bonding? valence electrons

16. Explain the OCTET RULE.

The central atom of a compound must have 8 valence electrons around it.

17. List the octet exceptions, and the valence electrons the elements have.

Boron - 6 valence electrons

Beryllium - 4 valence electrons

Aluminum - 6 valence electrons

18. Explain Expanded Octets.

If the central atom is in period 3 & higher it can have more than 8 valence electrons

19. List the properties of IONIC bonds.

a. Brittle

b. conducts electricity

c. dissolves in water

d. Formula unit

e. Crystal structure

f. high EN differences

g. Solids @ room Temp

h. metal - nonmetal

transfer electrons

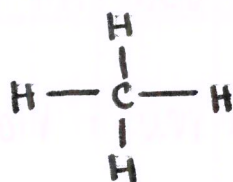
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20. Explain how to name covalent bonds, and pretend you are explaining it to someone who has never heard of how to name covalent bonds. (BE VERY VERY VERY DETAILED)

1. figure out how many of each element you have
2. look at prefixes for that number
3. for the 1st element, put prefix in front & keep element name the same
↑
NONO
4. for the 2nd element, put prefix in front, element name stays the same except at the end change it to -ide -

21. Give the empirical and molecular formulas for the following pictures

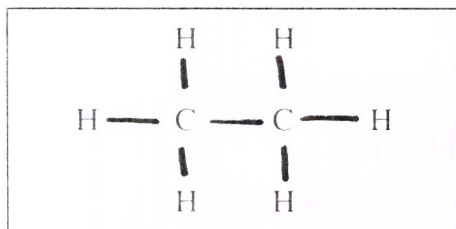
a.



empirical - CH_4

molecular - CH_4

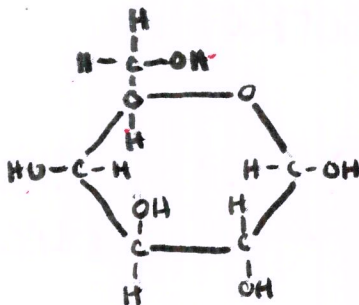
b.



empirical - CH_3

molecular - C_2H_6

c.



empirical - $\text{C}_6\text{H}_6\text{O}(\text{OH})_6$

molecular - $\text{C}_6\text{H}_6\text{O}(\text{OH})_6$

22. Explain how to find the Empirical Formula from Mole Ratio

- a. STEP 1 Divide each mole quantity by smallest quantity
- b. STEP 2 assign ratios as subscripts
- c. STEP 3 make sure ratios are whole numbers

NOTES

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23. Explain how to find the Empirical Formula from Grams.

- a. STEP 1 *convert grams to moles (divide by molar mass)*
- b. STEP 2
- c. STEP 3
- d. STEP 4
- same as 1-3 from 22*

NOTES

24. Explain how to find the Empirical Formula from Percents.

- a. STEP 1 *change % to grams*
- b. STEP 2
- c. STEP 3
- d. STEP 4
- e. STEP 5
- same as 1-4 from 23*

NOTES

25. What does a Molecular formula tell you? *exact # of each element*

26. What is the Molecular Formula also called? *actual formula*

27. The molecular formula for a compound is always a whole -- number multiple of the empirical formula.

28. Explain how to determine the Molecular Formula.

- a. STEP 1 *determine empirical formula*
- b. STEP 2 *find empirical formula mass*
- c. STEP 3 *Divide Molecular mass by empirical mass = multiplier*
- d. STEP 4 *multiply the subscripts by multiplier*

(warm up from 2/1-2/2)

NOTES

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29. What is the empirical and molecular formula that has a carbon to hydrogen ratio of 3 to 6? SHOW

STEPS

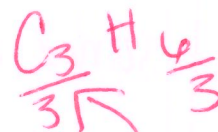
a. Empirical



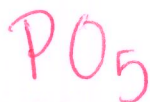
b. Molecular



C_3H_6 can reduce!

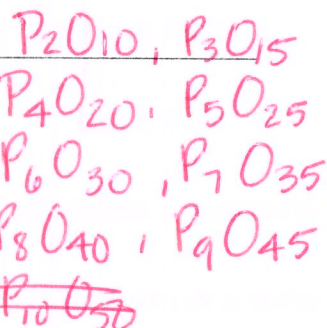


30. Calculate the empirical formula for a compound composed of 1 mole phosphorus and 5 moles of oxygen.



31. Write a possible molecular formula for the above empirical formula.

a. BE SURE TO SHOW YOUR STEPS BELOW!!!!!!



32. Circle the choice(s) that have the same empirical formula.

- A. NO_2 and SO_2 C. P_2O_5 and P_4O_{10}
 B. C_3H_5 and C_7H_{14} D. CO and CO_2

33. As elements bond they _____ heat, as the elements go through fission they _____ heat.

34. The effect of polar bonds on the entire molecule depends on the molecular shape.

35. Polar molecules will have:

- a. δ^+ _____ and δ^- _____ charge
 b. have an asymmetrical shape.

36. What are reasons for an asymmetrical shape?

LONE PAIRS (central atom), Different element

37. POLAR MOLECULES AND POLAR BONDS ARE DIFFERENT!!!!

DOING FRIDAY!