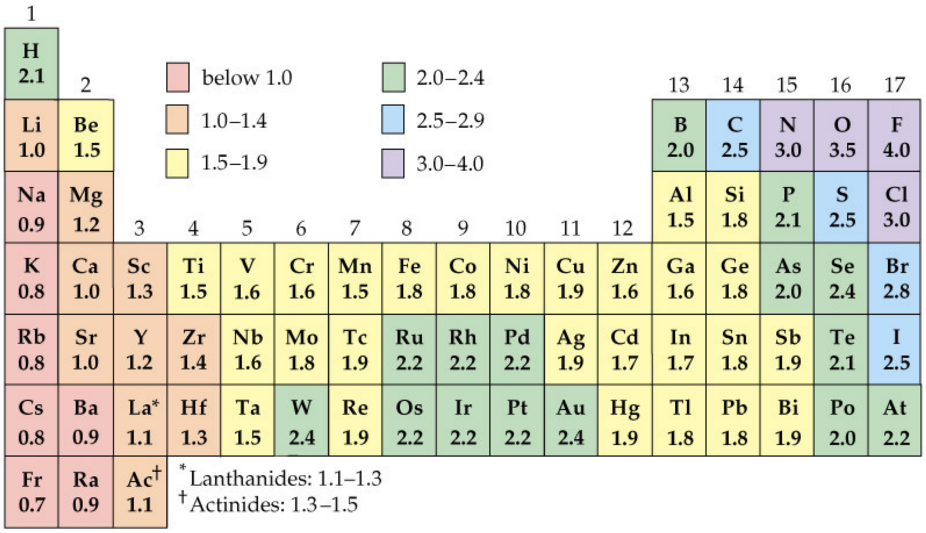
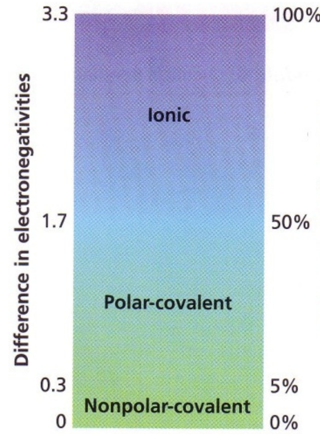
Ch. 6 Bonding Packet Name Mr. Sudbury - Key Period_____ Date____

Section 1: Types of Bonds: In this section you will examine and classify the following compounds as ionic, polar-covalent, or non-polar-covalent. Remember that you can determine the type of bond by finding the *difference in electronegativity*.





1. Define electronegativity:

   A measure of the ability of an atom in a chemical compound to attract electrons.

2. What is the difference in an ionic and covalent bond?

   Ionic bonds have a large difference in electronegativity while covalent bonds have a small diff. Also, ionic bonds are between metals & nonmetals.

3. What is the difference in a polar-covalent and non-polar-covalent bond?

   Both "share" electrons but polar covalent do not share equally... there are two distinct poles. non-polar covalent share equally.

4. What type of bond forms between potassium and chloride? *(Prove your answer with math and compare it to the chart.)*

   K=0.8 Cl=3.0 3.0-0.8=2.2

   Choose one: (ionic) (polar-covalent) (non-polar-covalent)

5. What type of bond forms between rubidium and oxygen? *(Prove your answer with math and compare it to the chart.)*

   Rb=0.8 O=3.5 = 3.5-0.8 = 2.7

   Choose one: (ionic) (polar-covalent) (non-polar-covalent)

6. What type of bond forms between carbon and oxygen? *(Prove your answer with math and compare it to the chart.)*

   C=2.5 O=3.5 3.5-2.5=1.0

   Choose one: (ionic) (polar-covalent) (non-polar-covalent)

7. What type of bond forms two oxygen atoms in a diatomic molecule? *(Prove your answer with math and compare it to the chart.)*

   Pick any diatomic atom and when you subtract it always = 0

   Choose one: (ionic) (polar-covalent) (non-polar-covalent)

8. What type of bond is calcium fluoride (CaF_2)? *(Prove your answer with math and compare it to the chart.)*

   Ca=1.0 F=4.0 4.0-1.0=3.0

   Choose one: (ionic) (polar-covalent) (non-polar-covalent)

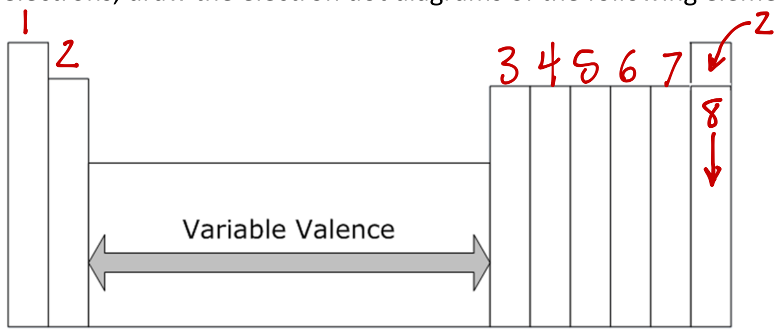
9. What type of bond is nitrogen monoxide (NO)? *(Prove your answer with math and compare it to the chart.)*

   N=3.0 O=3.5 3.5-3.0=0.5

   Choose one: (ionic) (polar-covalent) (non-polar-covalent)

Section 2: Electron Dot Diagrams.

Before you continue, label each box on the blank periodic table with the number of valence electrons. Remember that the number of valence electrons is a group property *(with the exception of Helium who doesn't follow the trend.)* Once you have filled in the PT with the number of valence electrons, draw the electron dot diagrams of the following elements.



10. Hydrogen H•
11. Potassium K•
12. Calcium •Ca•
13. Beryllium •Be•
14. Aluminum •Al•
15. Gallium •Ga•
16. Silicone •Si•
17. Phosphorus •P:
18. Sulfur :S:
19. Iodine :I:
20. Bromine :Br:
21. Argon :Ar:
22. Helium •He•

"Full" octet w/ only two valence e^-

Section 3: Draw the Lewis Structures for the following compounds. Review the 5 steps for drawing Lewis structures below and follow each step showing your work along the way.

Example: SiF_4

Step 1: Si = 1
F = 4

Step 2: Si = 4VE = •Si•

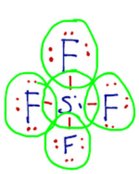
F = 7VE = :F: :F: :F:

Step 3: Total VE = 4+7+7+7 = 25VE

Step 4:

Step 5:

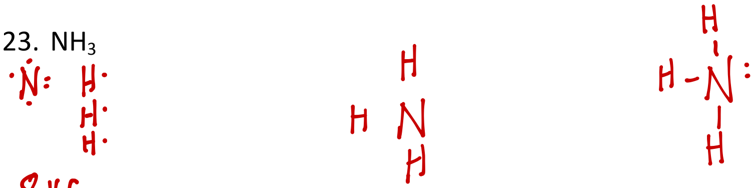
Step 6: Verify Octet



Steps for Drawing Lewis Structures:

1. Determine the type and number of atoms in the molecule.
2. Write the electron-dot notation for each type of atom in the molecule.
3. Determine the total number of valence electrons in the atoms to be combined.
4. Arrange the atoms to form a skeleton structure for this molecule. *(If carbon is present, it is likely the central atom. Otherwise, the least electronegative atom is central (except for hydrogen, which is never central).* Then connect the atoms by electron-pair bonds.
5. Add unshared pairs of electrons so each atom shares a pair of electrons and each nonmetal is surrounded by eight electrons. *(This is to fill the octet. Remember that Hydrogen is full with 2 electrons so never give any unshared pairs to a hydrogen atom.)*
6. Count the electrons in the structure to be sure the number of valence electrons used equals the number available (from step 3). Be sure the central atom and other atoms besides hydrogen have an octet.

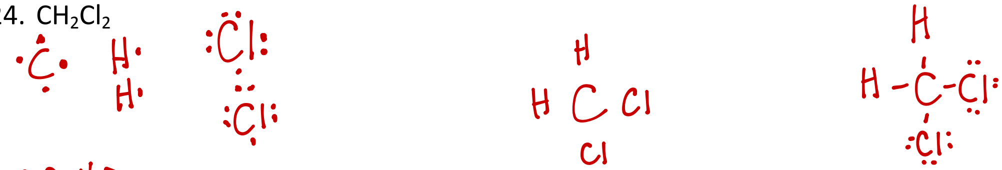
23. NH_3



8 VE

✓ 8 VE

24. CH_2Cl_2



20 VE

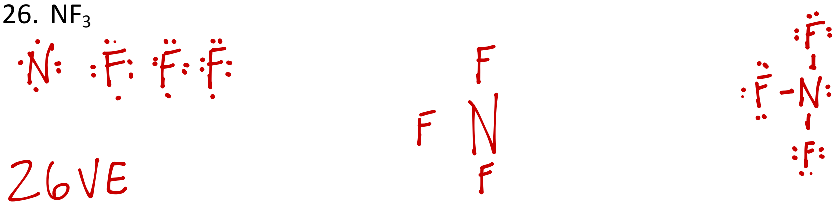
✓ 20 VE

25. H_2O

8VE

✓ 8VE

26. NF_3



26VE

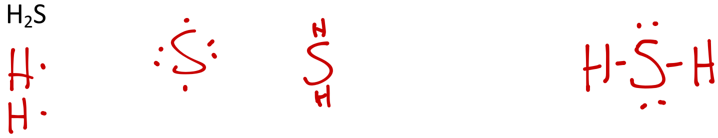
✓ 26 VE

27. H_2O_2

14VE

✓ 14 VE

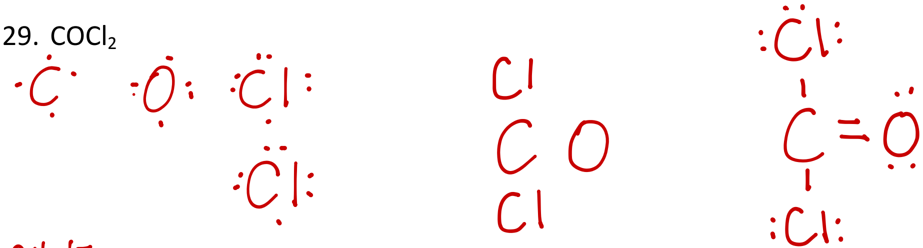
28. H_2S



8VE

✓ 8 VE

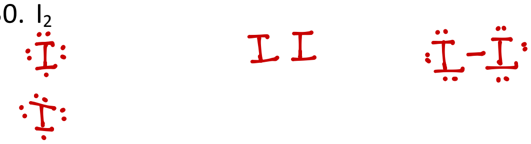
29. $COCl_2$



24VE

✓ = 24 VE

30. I_2



14 VE

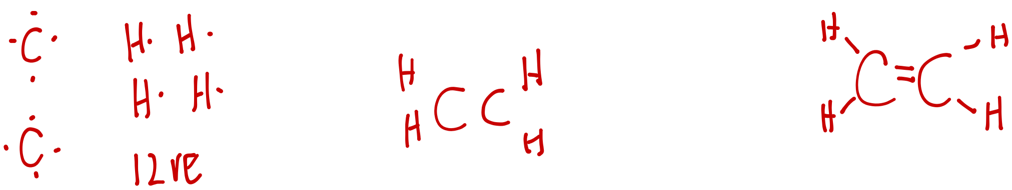
√ 14 VE

31. PCl_3

26 VE

√ = 26 VE

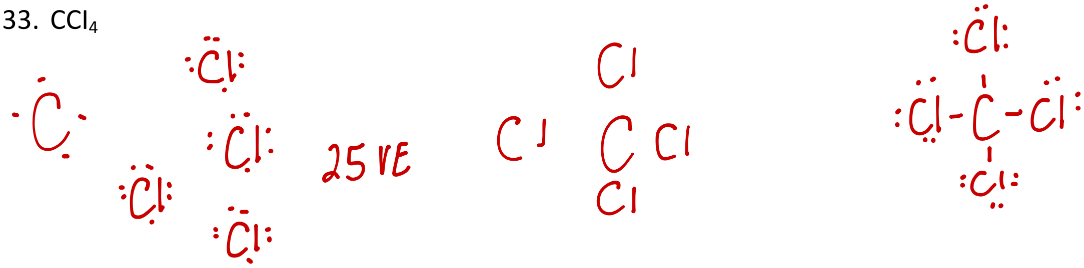
32. C_2H_4



12 VE

√ 12 VE

33. CCl_4



25 VE

√ 25 VE

34. HCN

10 VE

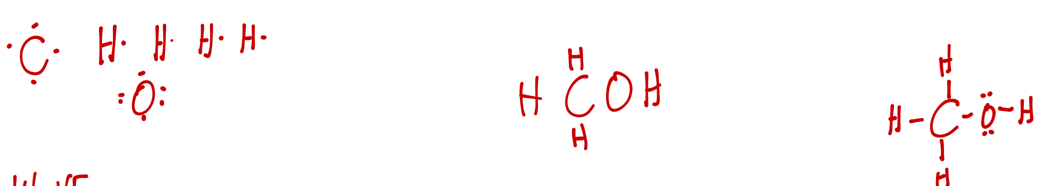
√ 10 VE

35. SiO_2

16 VE

√ = 16 VE

36. CH_4O



14 VE

√ 14 VE

For 23-36 go back and label the molecular geometry for each molecule.

23. tetrahedral
24. tetrahedral
25. bent
26. trigonal planar * b/c of unshared pair
27. linear
28. linear
29. trigonal planar
30. Linear
31. Trigonal pyramidal – Because the top of pyramidal is lone pair.
32. linear
33. tetrahedral.
34. linear
35. linear
36. tetrahedral