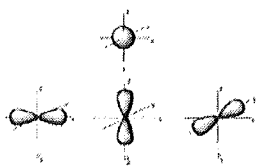


Atomic Theory Unit Review

Name: Key



1. Explain why members of the same family have the same chemical reactivity.

- same number of valence electrons
- they will gain, lose or share the same amount of e^- 's in order to satisfy the octet, leading to trends in chemical reactivity

2. Write a statement about the trends on the periodic table of the following properties

a) size of the atom

- decreases across
- increases down

b) size of the ion

- anions are larger than their neutral element
- cations are smaller than their neutral element

c) electronegativity

- increases across
- decreases down

d) ionization energy

- increases across
- decreases down

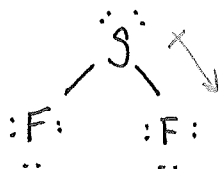
3. a) How does the electronegativity trend explain all of the other trends?

- EN is the relative ability of an element to attract electrons to itself. So, if EN is high the nucleus will 'hold' e^- 's tightly - this leads to higher ionization energy and smaller sizes

b) If the difference between two atoms' electronegativity is greater than 1.7, the bond between those atoms is considered to be ionic.

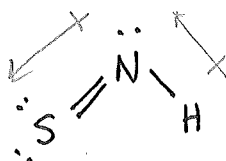
4. Draw the Lewis diagrams for the following molecules:

a) SF_2

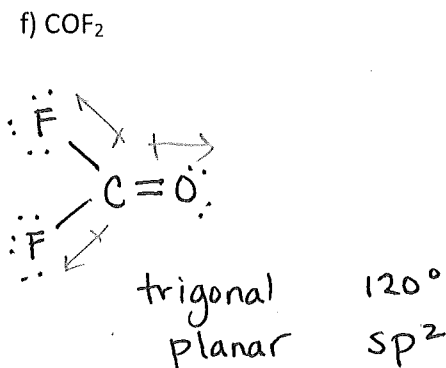
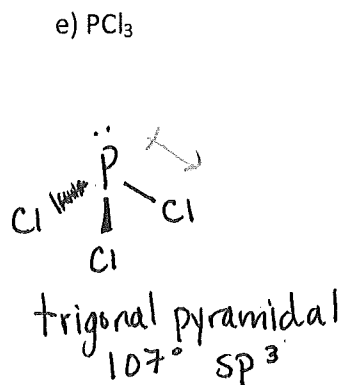
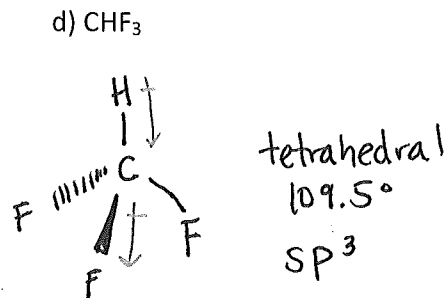
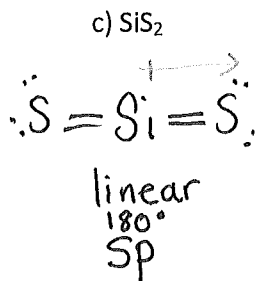


104.5°
bent
 sp^3

b) NSH



120°
bent (won't be tested on this shape/angle)
 sp^2

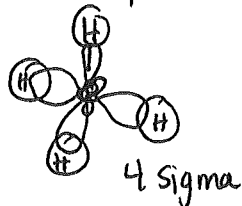


5. In the space above, for each of the structures in question 4, determine the following:

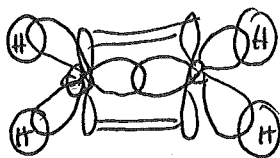
- polarity of bonds
- bond angles
- shape name
- hybridization of the central atom.

6. Explain the number of sigma and pi bonds in the following structures:

a. CH₄

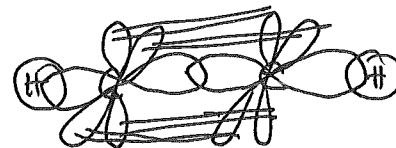


b.



double bonds = 1 sigma, 1 pi (on each carbon)

c.



triple bonds = 1 sigma
2 pi

7. Which of the following hybridizations is associated with having 4 elements bonded to a central atom?

- sp
- sp²
- c) sp³
- none of these

8. Which of the following is associated with a bond angle of 120°?

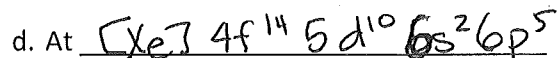
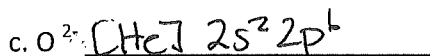
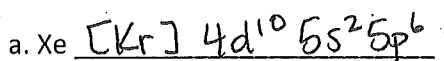
- sp
- b) sp²
- sp³
- none of these

9. Fill in the chart:

a)

Molecule	Lewis dot diagram	Molecular shape	Shape diagram Including polarity	Hybridization of central atom
CH ₂ Cl ₂		tetrahedral		sp ³
CO ₃ ²⁻		trigonal planar		sp ²
HCN	H-C≡N:	linear		sp

10. What is the electron configuration (core notation) of the following?



11. Rank the following bonds in order of most polar to least polar.

a) B-O

$$\Delta EN = |2.0 - 3.5|$$

$$= 1.5$$

∴ polar cov.

b) C-O

$$\Delta EN = |2.5 - 3.5|$$

$$= 1.0$$

∴ polar cov.

c) N-O

$$\Delta EN = |3.0 - 3.5|$$

$$= 0.5$$

∴ polar cov.

d) O-O

$$\Delta EN = |3.5 - 3.5|$$

$$= 0$$

∴ pure cov.

most polar

a > b > c > d

least polar