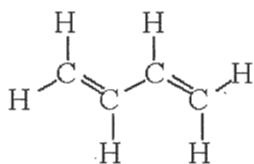
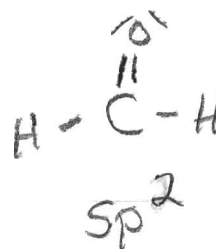
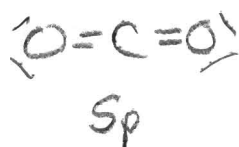
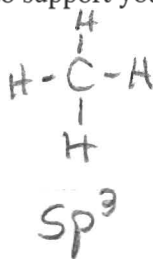
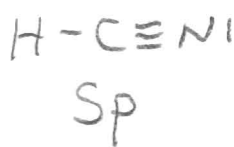


1. How many sigma (σ) bonds and pi (π) bonds are in the following molecule?

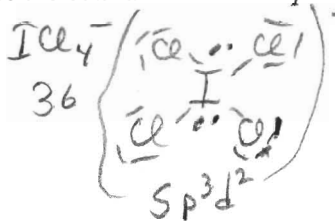
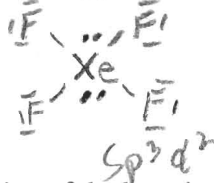
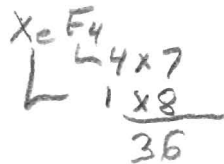


9 σ
2 π

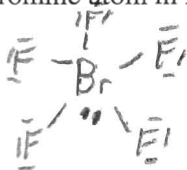
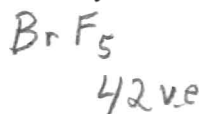
2. Determine the hybridization of the carbon atom in each of the following molecules: HCN, CH₄, CO₂, and CH₂O? Show a Lewis structure of each to support your answers.



3. In which of the following molecules or ions does the central atom have sp³ hybridization: XeF₄, ICl₄⁻, and NH₃? Show the Lewis structure to support your answer.



4. What is the hybridization of the bromine atom in BrF₅? Show the Lewis structure to support your answer.



sp³d²

5. What is the molecular geometry around an atom that is sp³ hybridized and has two lone pairs of electrons?

- a. bent
- b. linear
- c. trigonal pyramidal
- d. trigonal planar
- e. trigonal bipyramidal

1. e



Key

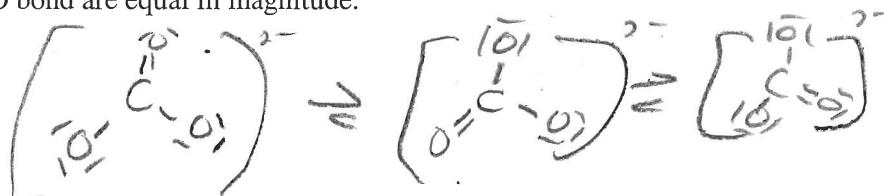
6. The carbonate ion is known to be planar with all the oxygen atoms equidistant from the central carbon atom. On the basis of these facts, which of the following conclusions are true concerning this ion?

- 1. It can be represented by three equivalent resonance structures.
- 2. The carbon atom is sp^2 hybridized.
- 3. The dipoles associated with each C-O bond are equal in magnitude.

- a. 1 only
- b. 2 only
- c. 3 only
- d. 1 and 2
- e. 1, 2, and 3

→

e. 1, 2, and 3



7. Which intermolecular forces are present in $SO_2(s)$?

- 1. London dispersion
- 2. dipole-dipole
- 3. hydrogen bonding

- a. 1 only
- b. 2 only
- c. 3 only
- d. 1 and 2
- e. 1 and 3

→

d. 1 and 2

18 v.e



8. Which of the following molecules would be expected to form hydrogen bonds in the liquid state or solid state:

H_2SO_4 , HF, CH_3OH (methanol), and CH_2O (formaldehyde)? (Hint: look at the structures)

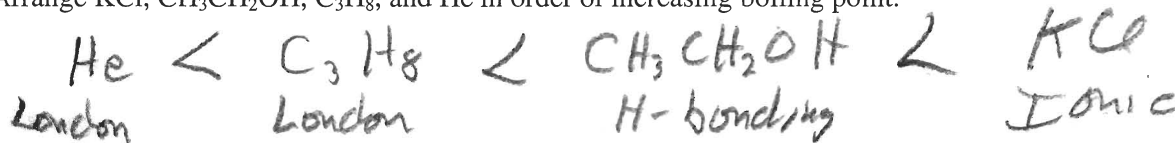
- a. H_2SO_4 , HF, and CH_3OH
- b. HF and CH_3OH
- c. H_2SO_4 , HF, and CH_2O
- d. HF, CH_3OH , and CH_2O
- e. CH_3OH and CH_2O

the H's are not bonded to the O

9. Arrange H_2O , H_2S , and SiH_4 in order from lowest to highest boiling point. (Hint: look at the intermolecular forces.)



10. Arrange KCl, CH_3CH_2OH , C_3H_8 , and He in order of increasing boiling point.



11. In which one of the following pure solids is it necessary to break covalent bonds to make a liquid or gas?

- a. KCl
- b. Ne
- c. CO_2
- d. NH_3
- e. SiO_2

e. SiO_2

← Quartz has covalent network structure

12. Ask any CHEMISTRY question you felt should have been on this quiz and supply the correct answer.