Name: KEY Class: Date:

Molecular Geometries and Hybridization Review

From page 264 of Chemistry: Matter and Change

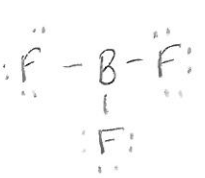
Examples

Determine the **molecular shape**, **bond angle**, and **hybrid orbitals** for each molecule:

1. boron trifluoride

BF_3

3
21
24

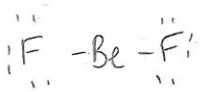


trigonal planar
120°
sp^2

2. beryllium fluoride BeF_2

ionic

2
14
16

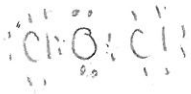


linear
sp
180°

3. oxygen dichloride

OCl_2

6
14
20

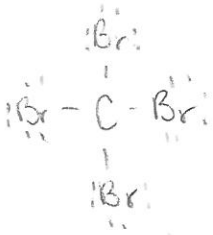


bent
104.5°
sp^3

4. carbon tetrabromide

CBr_4

6
4
32

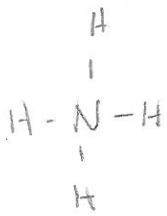


tetrahedral
109.5°
sp^3

5. ammonium

NH_4^{1+}

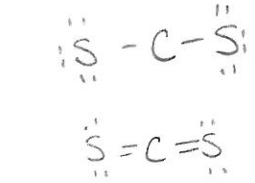
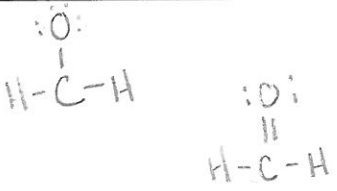
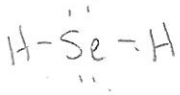
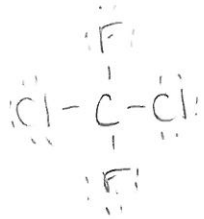
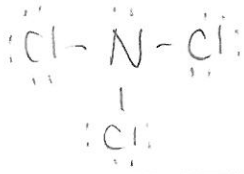
5
+4
9
−1
8



tetrahedral
109.5°
sp^3

Name:_____ Class:_____ Date:_____

6. Fill in the following table.

Molecule	Lewis structure	Molecular geometry	Bond angle	Hybridization
CS_2		linear	180°	sp
CH_2O		trig planar	120°	sp^2
H_2Se		bent	104.5°	sp^3
CCl_2F_2		tetrahedral	109.5°	sp^3
NCl_3		trigonal pyramidal	107.3	sp^3

Name:_____ Class:_____ Date:_____

Homework

1. Define the term bond angle.

Angle formed between bp/lone pairs of electrons and the central atom

2. Compare the size of an orbital that has a shared electron pair with one that has a lone electron pair.

lone pairs occupy more space than a shared (bonded) electron pair

3. Describe how the presence of a lone pair of electrons affects the spacing of atoms bonded to the central atom.

lone pairs have repulsion and are closer to the central atom so it pushes the other bonded atoms together

4. Identify the type of hybrid orbitals and bond angles present for a molecule with a tetrahedral shape.

sp^3

107.5°

5. Compare the molecular shapes and hybrid orbitals of phosphorus trifluoride and phosphorus pentafluoride. Why do they have different molecular geometries?

PF_5 has an expanded octet and makes 5 bonds, while PF_3 has 3 bp and 1 lp; a total of 4 pairs of electrons contributing to the model shape

Continue on back!