

Molecular Shapes and Polarity • Chemistry 210 •

For each of the following covalent molecules, answer the questions about the molecule. In each case, answering the questions will be aided by determining the electron arrangements and shapes of the molecules in question. Answer the questions on a separate sheet.

See 2nd page for Lewis Dot Structures

1. Consider the molecule SO_3
- A. What are the bond angles in the molecule? 120°
- B. What is the hybridization on the sulfur atom? sp^2
- C. Are the bonds in the molecule polar? *yes*
- D. Is the overall molecule polar? *no*
-

2. Consider the molecule PBr_3
- A. What is the electron arrangement on phosphorus? *tetrahedral*
- B. What is the hybridization on the phosphorus atom? sp^3
- C. What is the shape of the molecule? *trigonal pyramidal*
- D. Are the bonds in the molecule polar? *yes*
- E. Is the overall molecule polar? *yes*
-

3. Consider the molecule CH_2F_2
- A. What is the shape the molecule? *tetrahedral*
- B. What is the hybridization on the carbon atom? sp^3
- C. Is the overall molecule polar? *yes*
- D. Sketch the molecule (indicating any partial charges).
(see other sheet)
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4. Consider the molecule SeI_2
- A. What are the bond angles in the molecule? $< 109.5^\circ$ (*$\approx 105^\circ$*)
- B. What is the hybridization on the selenium atom? sp^3
- C. Are the bonds in the molecule polar? *no*
- D. Is the overall molecule polar? *no*
- E. Sketch the molecule showing hybrid orbitals and their orbital overlaps.
(see other sheet)
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5. Consider the molecule BrF_3
- A. What is the shape of the molecule? *T-shaped*
- B. What is the hybridization on the bromine atom? sp^3d
- C. Are the bonds in the molecule polar? *yes*
- D. Is the overall molecule polar? *yes*
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6. Consider the molecule CH_3OH
- A. What is the hybridization on the carbon and oxygen atoms?
 $\text{C} = sp^3$, $\text{O} = sp^3$
- B. What is the shape with respect to the carbon atom?
tetrahedral
- C. What is the shape with respect to the oxygen atom?
bent (105°)
- D. Is the overall molecule polar? *yes*
- E. Sketch the molecule showing hybrid orbitals and their orbital overlaps.
(see other sheet)
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7. Consider the molecule CH_3CHCH_2
- A. What is the hybridization on each of the 3 carbons?
 $\text{C}_1 = sp^3$, $\text{C}_2 = sp^2$, $\text{C}_3 = sp^2$
- B. What are the bond angles around each of the 3 carbons?
 $\text{C}_1 = 109.5^\circ$, $\text{C}_2 = 120^\circ$, $\text{C}_3 = 120^\circ$
- C. Is the overall molecule polar?
NO

Sketches

