

CH301 Fall 2009 Practice Quiz 3 Answer Key

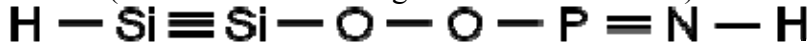
1. Which of the bonds below could be found in a non-polar molecule?

- I. C=C
- II. H-F
- III. B-Cl

- 1. I
- 2. II
- 3. III
- 4. I and II
- 5. I and III
- 6. II and III
- 7. I, II and III

A C=C bond could be found in any symmetrical molecule (e.g. C₂H₄), which would be non-polar. An H-F bond could only be found in the molecule H-F because both species can form only a single bond. A B-Cl bond could be found in a symmetrical molecule (e.g. BCl₃) and so could be found in a non-polar molecule.

2. Consider the molecule below; how many different hybridizations are required to describe all of its central atoms? (Note: the non-bonding electrons are omitted)



- 1. 1
- 2. 2
- 3. 3
- 4. 4
- 5. 5

The central atoms, from left to right, have hybridizations of sp , sp , sp^3 , sp^3 , sp^2 , sp^2 .

3. Which of the following does not have a pyramidal molecular geometry?

- 1. IOF₃
- 2. XeCl₄
- 3. PH₃
- 4. AsI₅

The molecule IOF₃ would have a see-saw geometry because its lone pair would go into the equatorial position.

4. Which of the following molecules is/are polar?

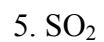
- I. SO₂
- II. O₃
- III. CH₂F₂

- 1. I
- 2. II
- 3. III
- 4. I and II
- 5. I and III
- 6. II and III
- 7. I, II and III

SO₂ has polar bonds and an asymmetrical molecular geometry and is therefore polar. O₃ is a famous exception to the simple guidelines for molecular polarity and is polar in spite of having only non-polar bonds. CH₂F₂ is asymmetrical and thus its dipoles do not cancel - it is polar.

5. Which of the compounds below would have the greatest number of pi bonds?

- 1. XeO₃
- 2. CH₃NHCHCCH



Xenon tetroxide would have 3 pi bonds, all of the other choices have 2 or less.

6. Which of the molecules below will contain a $\sigma_{\text{sp}^2, \text{sp}^3}$ bond?

