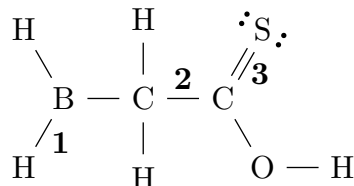


This print-out should have 6 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

LDE Identifying Bonds 004

001 5.0 points

Based only on the difference in electronegativity (ΔEN) identify the types of the labeled bonds in the molecule below, from left to right:



1. ionic, non-polar covalent, ionic
2. polar covalent, non-polar covalent, non-polar covalent
3. polar covalent, non-polar covalent, polar covalent **correct**
4. non-polar covalent, non-polar covalent, polar covalent
5. ionic, polar covalent, polar covalent

Explanation:

The B-H bond will have a ΔEN of less than 2 but more than zero, and thus will be a polar covalent bond. The C-C bond will have a ΔEN of zero, and thus will be non-polar covalent. The C=S bond will have a ΔEN of less than 1 but more than zero, and thus will be polar covalent.

LDE VB Hybridization 005

002 5.0 points

All of the molecules below have the same hybridization except for one of them. Which is it?

1. IBr_2^-
2. PH_5
3. IF_5 **correct**

4. ClF_3

5. TeCl_4

Explanation:

The molecule IF_5 would have 6 regions of electron density around the central atom giving it sp^3d^2 hybridization. All of the other choices have 5 regions of electron density giving them sp^3d hybridization.

LDE VSEPR Molecular Geometry 009

003 5.0 points

A certain molecule has a central atom with 2 singly bonded atoms and 2 doubly bonded atoms. Which of the following is a possible molecular geometry?

1. linear
2. tetrahedral **correct**
3. trigonal pyramidal
4. see-saw
5. trigonal bipyramidal
6. square planar

Explanation:

Based on the provided description, the central atom has four bonded atoms and 12 total valence electrons which means it has no non-bonding electrons. It is therefore tetrahedral for both electronic and molecular geometry.

LDE Molecular Polarity 001

004 5.0 points

Which of the following molecules is/are polar?

- I) NO_3^-
- II) NO
- III) NO_2

1. I only
2. I and III
3. II only

4. I and II

5. II and III correct

6. III only

7. I, II and III

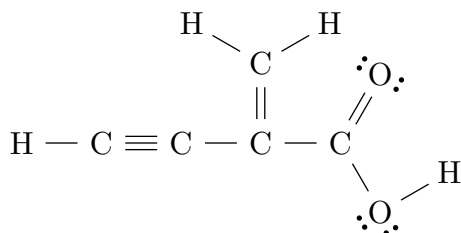
Explanation:

All of the molecules contain polar N-O and N=O bonds. But, nitrate is symmetrical and therefore non-polar. Nitric oxide and nitrogen dioxide are both asymmetrical and polar.

LDE VB Sigma Pi Bonds 006

005 5.0 points

How many σ (sigma) and how many π (pi) bonds are there in the Lewis structure of the following organic molecule?



1. 10; 4 correct

2. 14; 0

3. 10; 6

4. 12; 0

5. 6; 4

Explanation:

LDE Hybridization and MO Theory 001

006 5.0 points

Which of the molecules below will contain more than one σ_{sp^2,sp^2} bond?

1. $\text{CF}_3\text{CHCHCBr}_3$

2. CH_3PHCH_3

3. $\text{SiH}_3\text{CHCHCHO}$ correct

4. CH_2SF_2

Explanation:

Both $\text{SiH}_3\text{CHCHCHO}$ and $\text{CF}_3\text{CHCHCBr}_3$ contain a σ_{sp^2,sp^2} bond (the C=C bond), but $\text{SiH}_3\text{CHCHCHO}$ contains an additional σ_{sp^2,sp^2} bond between C and O.