

## HW07 - VSEPR

⚠ This is a preview of the published version of the quiz

Started: Jun 24 at 11:41am

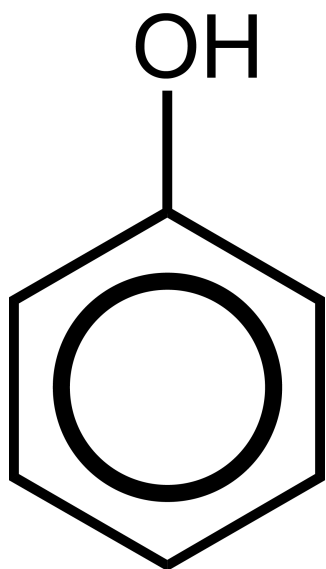
### Quiz Instructions

## Homework 07 - VSEPR

### Question 1

1 pts

Consider the structural formula of phenol.



The active ingredient in some oral anesthetics used in sore throat sprays. What is the molar mass of phenol?

☐ 89 g/mol

☐ 50 g/mol

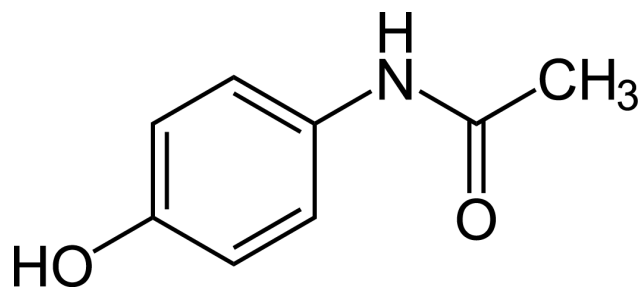
☐ 94 g/mol

☐ 17 g/mol

### Question 2

1 pts

This is the condensed structural formula for acetaminophen, the active ingredient in the over-the-counter medication Tylenol.



What is the molecular formula of acetaminophen?

☐  $C_8H_8NO$

☐  $C_8H_5NO_2$

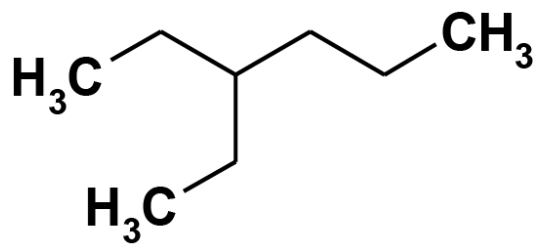
☐  $C_8H_9NO_2$

☐  $C_8H_{11}NO_2$

### Question 3

1 pts

The following structure is the carbon skeleton for a structural isomer of octane with most of the hydrogen and carbon atoms omitted.



What is the molecular formula of this isomer?

☐  $C_8H_{24}$

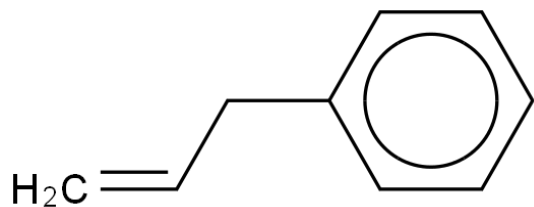
☐  $C_8H_8$

☐  $C_8H_{18}$

☐  $C_8H_{16}$

**Question 4****1 pts**

Consider the following structure:



How many single bonds and double bonds (respectively) are represented by this condensed formula?

☐ 12, 7

☐ 15, 4

☐ 11, 7

☐ 4, 7

☐ 12, 4

**Question 5****1 pts**

The electronegativity of H is...

☐ about equal to that of C.

☐ a lot less than that of C.

☐ a lot more than that of C.

**Question 6****1 pts**

Which pair of bonded atoms has the largest dipole moment?

☐ C-O

☐ C-F

☐ C-N

☐ C-Cl

### Question 7

1 pts

Consider a 3-atom molecule A-B-A for which B has a total of only four valence electrons - enough to make two bonds. Predict the A-B-A bond angle.

☐ 109.5°

☐ 180°

☐ 90°

☐ 120°

### Question 8

1 pts

What is the shape (molecular geometry) of  $\text{COCl}_2$ ?

☐ trigonal planar

☐ tetrahedral

☐ trigonal pyramidal

☐ T-shaped

### Question 9

1 pts

Which of the following has bond angles slightly LESS than 120°?

☐  $\text{SF}_2$

☐  $\text{SO}_3$

☐

$O_3$

☐  $NO_3^-$

☐  $I_3^-$

**Question 10**

**1 pts**

Draw the Lewis structure for  $NO_2^-$ . How many single bonds, double bonds, triple bonds, and unshared pairs of electrons are on the central atom, in that order?

☐ 2, 0, 0, 2

☐ 1, 0, 1, 0

☐ 0, 0, 1, 1

☐ 4, 0, 0, 0

☐ 1, 1, 0, 1

**Question 11**

**1 pts**

Determine the molecular geometry of the ion  $NO_2^-$ .

☐ trigonal pyramidal

☐ bent or angular

☐ none of these

☐ trigonal planar

☐ linear

**Question 12**

**1 pts**

What is the electronic geometry of  $IF_4^-$ ?

- ☐ square planar
- ☐ tetrahedral
- ☐ octahedral
- ☐ square pyramidal
- ☐ trigonal bipyramidal

**Question 13**

1 pts

What is the molecular geometry of  $\text{IF}_4^-$ ?

- ☐ see-saw
- ☐ trigonal planar
- ☐ square pyramidal
- ☐ square planar
- ☐ octahedral

**Question 14**

1 pts

Is  $\text{IF}_4^-$  non-polar?

- ☐ It cannot be determined from the structure.
- ☐ Yes, it is non-polar.
- ☐ No, it is polar.

**Question 15**

1 pts

What is the geometry around the left-most carbon in the molecule  $\text{CH}_2\text{CHCH}_3$ ?

☐ trigonal pyramidal

☐ tetrahedral

☐ trigonal planar

☐ linear

**Question 16**

**1 pts**

Which of the following has bond angles of  $90^\circ$ ,  $120^\circ$ , and  $180^\circ$ ?

☐  $\text{IF}_5$

☐  $\text{SF}_4$

☐  $\text{XeF}_4$

☐  $\text{PF}_6^-$

☐  $\text{ICl}_4^-$

**Question 17**

**1 pts**

A central atom is surrounded by four chlorine atoms. Which of the following combinations is possible?

☐ a trigonal bipyramidal electronic geometry and t-shaped molecular geometry

☐ an octahedral electronic geometry and tetrahedral molecular geometry.

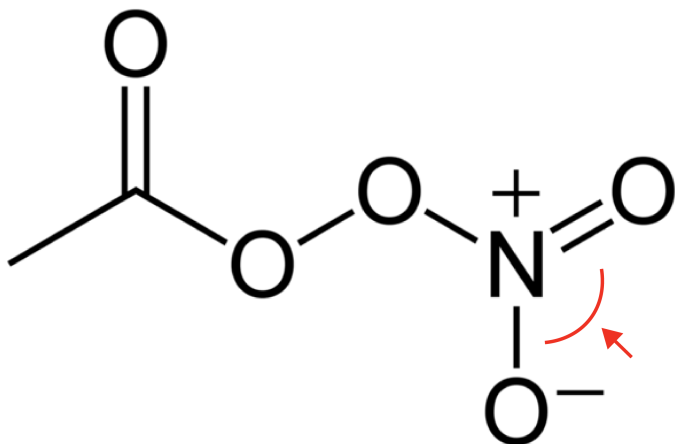
☐ a trigonal bipyramidal electronic geometry and seesaw molecular geometry

☐ an octahedral electronic geometry and square pyramidal molecular geometry

**Question 18**

**1 pts**

Consider the compound peroxyacetylnitrate, an eye irritant in smog.



Predict the indicated bond angle.

- ☐ 120°
- ☐ slightly less than 109.5°
- ☐ 109.5°
- ☐ slightly less than 120°
- ☐ 90°

**Question 19**

1 pts

Which of the following is a polar molecule?

- ☐ SF<sub>4</sub>
- ☐ CO<sub>2</sub>
- ☐ CCl<sub>4</sub>
- ☐ SO<sub>3</sub>
- ☐ XeF<sub>2</sub>

**Question 20**

1 pts



Which of the following statements about polarity is FALSE?

- ☐  $\text{CF}_4$  is a polar molecule.
- ☐ Linear molecules can be polar.
- ☐ Lone (unshared) pairs of electrons on the central atom play an important role in influencing polarity.
- ☐ Dipole moments can "cancel," giving a net non-polar molecule.
- ☐ Polar molecules must have a net dipole moment.

**Question 21**

1 pts

Which of the following molecules is nonpolar?

- ☐  $\text{SO}_2$
- ☐  $\text{CH}_3\text{Br}$
- ☐  $\text{NF}_3$
- ☐  $\text{H}_2\text{O}$
- ☐  $\text{BF}_3$

**Question 22**

1 pts

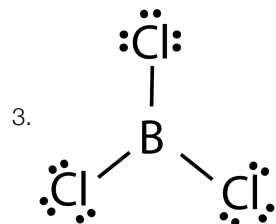
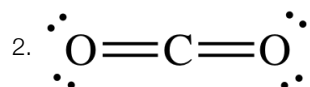
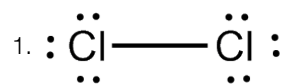
$\text{CHF}_3$  is (less, more) polar than  $\text{CHI}_3$  because...

- ☐ more, the C-H bond in  $\text{CHF}_3$  is a nonpolar bond.
- ☐ less, the three polar C-F bonds are symmetrical and cancel the dipole moments.
- ☐ less, the tetrahedral geometry decreases the polarity of C-F bonds.
- ☐ less, the C-H bond in  $\text{CHF}_3$  is a nonpolar bond.
- ☐ more, the C-F bonds are more polar than the C-I bonds.

## Question 23

1 pts

Which of the following molecules contains polar covalent bonds but is NOT itself a polar molecule?



☐ none fit the criteria

☐ 2 and 3 only

☐ 1 and 2 only

☐ 2 only

☐ 3 only

☐ 1, 2, and 3

☐ 1 and 3 only

## Question 24

1 pts

Which of the following molecules has the largest dipole moment?

☐ HI

☐ H<sub>2</sub>

☐ F<sub>2</sub>

☐ HBr

☐ HCl

**Question 25**

**1 pts**

Classify the molecule  $\text{PBr}_3$ .

- ☐ nonpolar molecule with polar bonds
- ☐ polar molecule with nonpolar bonds
- ☐ nonpolar molecule with nonpolar bonds
- ☐ polar molecule with polar bonds

**Question 26**

**1 pts**

Which of the following combinations of hybridization and molecular geometry is possible?

- ☐  $\text{sp}^2$ , linear
- ☐  $\text{sp}^3$ , trigonal pyramidal
- ☐  $\text{sp}^3\text{d}$ , octahedral
- ☐  $\text{sp}^2$ , tetrahedral

**Question 27**

**1 pts**

The  $\text{sp}^3$  hybridization has what percent s character and what percent p character respectively?

- ☐ 75%, 25%
- ☐ 33%, 67%
- ☐ 25%, 75%
- ☐ 50%, 50%

**Question 28**

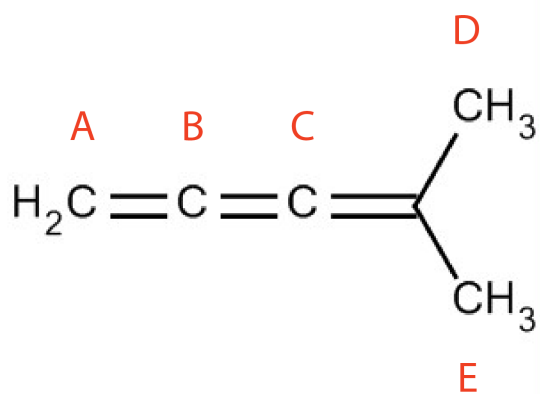
1 pts

What hybridization would you expect for Se when it is found in  $\text{SeO}_4^{2-}$ ?

☐  $\text{sp}^3\text{d}^2$ 
☐  $\text{sp}^3\text{d}$ 
☐  $\text{sp}^2$ 
☐  $\text{sp}^3$ 
**Question 29**

1 pts

Give the hybridization of each central atom in order from A to E:


☐  $\text{sp}^3, \text{sp}, \text{sp}, \text{sp}^3, \text{sp}^3$ 
☐  $\text{sp}^3, \text{sp}^2, \text{sp}^2, \text{sp}^3, \text{sp}^3$ 
☐  $\text{sp}^2, \text{sp}, \text{sp}, \text{sp}^2, \text{sp}^2$ 
☐  $\text{sp}^2, \text{sp}, \text{sp}, \text{sp}^3, \text{sp}^3$

**Question 30****1 pts**

What hybridization would you expect for C in ethyne ( $\text{C}_2\text{H}_2$ )?

☐  $\text{sp}^3$ ☐  $\text{sp}$ ☐  $\text{sp}^3\text{d}$ ☐  $\text{sp}^2$ **Question 31****1 pts**

$\text{sp}^2$  hybrid orbitals have...

☐ linear symmetry.☐ tetrahedral symmetry.☐ trigonal pyramidal symmetry.☐ trigonal planar symmetry.

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