HW05 - Bonding Fundamentals

Question 1 5 pts

Select the correct Lewis dot structure for the molecule containing one C, one Cl, and three H atoms.

-
-
-
-
-
-
-
-
-
-

Question 2 5 pts

How would you classify the bond in O_2?

- covalent double bond
- ionic bond
- covalent single bond
- covalent triple bond

Question 3 5 pts

When drawing the Lewis structure for ammonia (NH_3), we get how many shared (S), needed (N), and available (A) electrons, and how many lone pairs (LP)?

- S = 3, N = 14, A = 8; LP = 1
- S = 6, N = 8, A = 14; LP = 1
- S = 6, N = 14, A = 8; LP = 1
- S = 6, N = 14, A = 8; LP = 0

Question 4 5 pts

How many lone pairs of electrons are on nitrogen in NF_3?

- zero
- three
- two
- one

Question 5 5 pts

What are the values of S, N, and A for CH_3COCH_3?

S = shared electrons

N = needed electrons

A = available electrons

- S = 24
N = 26
A = 40
- S = 40
N = 20
A = 24
- S = 16
N = 40
A = 24
- S = 20
N = 40
A = 24

Question 6 5 pts

Select the correct Lewis Dot structure for the molecule containing one C and four F atoms.

-
-
-
-
-
-
-
-

Question 7 5 pts

Which of the following compounds contains exactly one unshared pair of valence electrons?

- H_2S
- SiH_4
- PH_3
- C_2H_4

Question 8 5 pts

Draw the Lewis Structure for CH_2O. How many lone pairs are found on the molecule?

- 2
- 0
- 1
- 4

Question 9 5 pts

Which of the following describes the C–C bond in acetylene (ethyne, C_2H_2)?

- single bond
- 1.5 bond in resonance
- triple bond
- double bond

Question 10 5 pts

Resonance is a concept that describes the bonding in molecules...

- by asserting that double or triple bonds 'flip' or resonate between two locations in the molecule.
- where there is more than one choice of location for a double or triple bond as deduced from Lewis dot structures. The true bonding is the average over all possible multiple bond locations.
- by asserting that electrons in a double bond can delocalize (split over) onto adjacent single bonds to make a bond and a half.

Question 11 5 pts

The carbonate ion (CO_3^{-2}) has how many resonance configurations?

- The carbonate ion does not exhibit resonance
- 2
- 3
- 4

Question 12 5 pts

When measuring a carbon-carbon bond in benzene, a compound that exhibits resonance, you would find that...

- 50% of the time we would measure a single bond and 50% of the time we would measure a double bond
- the bond strength of each bonding region in resonance is close to the average of a single and double bond.

Question 13 5 pts

Calculate the formal charge on N in the molecule NH_3.

- 0
- 1
- 2
- 3

Question 14 5 pts

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

Note: that weird hexagon with a circle in it is seen all the time if you google certain organic molecules such as pharmaceuticals. It represents the resonance within a phenyl ring, similar to benzene (shown below):

- 10, 14
- 12, 14
- 10, 4
- 12, 4
- 11, 7

Question 15 5 pts

Consider the structural formula of a compound that happens to be the active ingredient in many oral anesthetics used in sore throat sprays. What is the molar mass of this compound?

- 94 g/mol
- 77 g/mol
- 93 g/mol
- 89 g/mol

Question 16 5 pts

The following is the skeletal structure for a compound.

What is the molecular formula of this structure?

- C_6H_{14}
- C_6H_{12}
- C_6H_8
- C_6H_{10}

Question 17 5 pts

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

What is the empirical formula for this compound?

- $C_8H_9NO_2$
- $C_8H_{11}NO_2$
- $C_8H_9NO_3$
- C_8H_9NO

Question 18 5 pts

Consider the Lewis Structures of CO_2 and CH_2OH. Compared to the carbon-oxygen bonds in CO_2, the carbon-oxygen bond in CH_2OH are...

- stronger and longer
- weaker and longer
- weaker and shorter
- stronger and shorter

Question 19 5 pts

Which is the correct order of increasing bond strength?

- single, double, triple
- double, single, triple
- double, triple, single
- triple, double, single

Question 20 5 pts

Draw the Lewis structures for O_2 and O_3. Why does it take more energy to break apart the bond in O_2?

- The bond length in O_2 is greater than the bond length in O_3.
- The bond order in O_2 is greater than the bond order in O_3.
- The bond order in O_2 is greater than the bond order in O_3.