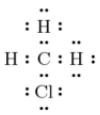
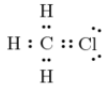
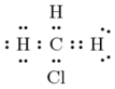
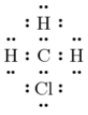
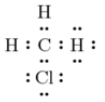
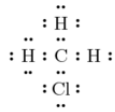
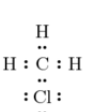
HW05 - Bonding Fundamentals

1 5 points

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

2 5 points

How would you classify the bond in O_2 ?

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

3 5 points

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

4 5 points

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

- zero
- three
- one
- two

5 5 points

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

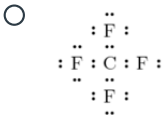
S = shared electrons
N = needed electrons
A = available electrons

- S = 20
  N = 44
  A = 24
- S = 16
  N = 40
  A = 24
- S = 24
  N = 20
  A = 44
- S = 44
  N = 20
  A = 24

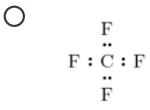
6 5 points

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










7 5 points

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

- SiH_4
- H_2S
- C_2H_4
- PH_3

8 5 points

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

- 1
- 2
- 4
- 0

9 5 points

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

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

10 5 points

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 (spill over) onto adjacent single bonds to make a bond and a half.

11 5 points

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

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

12 5 points

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.

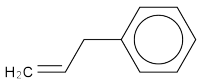
13 5 points

Calculate the formal charge on N in the molecule NH_3.

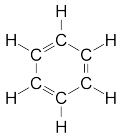
- 3
- 2
- 0
- 1

14 5 points

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



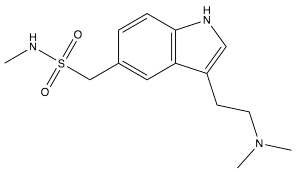
Note: that weird hexagon with a circle in it is seen all the time if you google certain organic molecules such as pharmaceuticals. It represents the resonance within a phenyl ring, similar to benzene (shown below):



- 12, 4
- 15, 4
- 12, 14
- 15, 14
- 11, 7

15 5 points

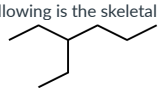
The following molecule is a migraine medication that acts as a vasoconstrictor. What is the molecular formula for this molecule?



- $C_{14}H_{20}N_2O_2S$
- $C_{14}H_{21}N_3O_2S$
- $C_{12}H_{18}NO_2$
- $C_{14}H_{19}N_3O_2S$
- $C_{13}H_{19}N_2O_2S$

16 5 points

The following is the skeletal structure for a compound.

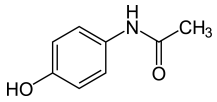


What is the molecular formula of this structure?

- C_8H_{18}
- C_8H_{24}
- C_8H_{16}
- C_8H_8

17 5 points

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_8NO
- $C_8H_5NO_2$
- $C_8H_{11}NO_2$

18 5 points

Consider the Lewis Structures of CO_2 and CH_3OH. Compared to the carbon-oxygen bonds in CO_2, the carbon-oxygen bond in CH_3OH are...

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

19 5 points

Which is the correct order of increasing bond strength?

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

20 5 points

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_3 is greater than the bond order in O_2
- The bond order in O_2 is greater than the bond order in O_3