

HW05

Question 1

1 pts

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

- ```
 ..
 : H :
 ..
 : H : C : H :
 ..
 : Cl :
```
- ```
  ..
  : H :
  ..
  : H : C : H :
  ..
  : Cl :
```
- ```
 H
 |
H : C : H
 |
 : Cl :
```
- ```
  H
  |
H : C :: Cl
  |
  H
```
- ```
 ..
 : H :
 ..
 : H : C : H :
 ..
 : Cl :
```
- ```
  H
  |
H : C : H :
  |
  : Cl :
```
- ```
 H
 |
: H : C :: H :
 |
 Cl
```
- ```
  ..
  : H :
  ..
  : H : C : H :
  ..
  : Cl :
```
- ```
 H
 |
H : C : H
 |
 Cl
```
- ```
  ..
  : H :
  ..
  : H : C : H :
  ..
  : Cl :
```

Question 2

1 pts

How would you classify the bond in O₂?

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

Question 3

1 pts

When drawing the Lewis structure for ammonia (NH₃), 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 = 6, N = 8, A = 14, LP = 1
- S = 6, N = 14, A = 8, LP = 0
- S = 3, N = 14, A = 8, LP = 1

Question 4

1 pts

How many lone pairs of electrons are on nitrogen in NF₃?

- one
- two
- three
- zero

Question 5

1 pts

What are the values of S, N, and A for CH₃COCH₃?

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

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

Question 6

1 pts

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

- ```
 F
 |
F : C : F :
 |
 F :
```
- ```
  ..
  : F :
  ..
  : F : C : F :
  ..
  : F :
```
- ```
 F
 |
F : C :: F
 |
 F
```
- ```
  ..
  : F :
  ..
  : F : C : F :
  ..
  : F :
```
- ```
 ..
 : F :
 ..
 F : C : F
 ..
 : F :
```
- ```
  ..
  : F :
  ..
  : F : C : F :
  ..
  : F :
```
- ```
 F
 |
: F : C :: F
 |
 F
```
- ```
  ..
  : F :
  ..
  F : C : F :
  ..
  : F :
```
- ```
 F
 |
F : C : F
 |
 F
```
- ```
  ..
  : F :
  ..
  F : C : F :
  ..
  : F :
```
- ```
 F
 |
F : C : F
 |
 F :
```

## Question 7

1 pts

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

- SiH<sub>4</sub>
- PH<sub>3</sub>
- H<sub>2</sub>S
- C<sub>2</sub>H<sub>4</sub>

## Question 8

1 pts

Draw the Lewis Structure for CH<sub>2</sub>O. How many lone pairs are found on the molecule?

- 0
- 4
- 2
- 1

## Question 9

1 pts

Which of the following describes the C–C bond in acetylene (ethyne, C<sub>2</sub>H<sub>2</sub>)?

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

## Question 10

1 pts

How many unshared electrons and bonding electrons exist around the central atom in ozone (O<sub>3</sub>)?

- six, two
- two, six
- zero, eight
- four, four

## Question 11

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

## Question 12

1 pts

The carbonate ion (CO<sub>3</sub><sup>2-</sup>) has how many resonance configurations?

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

## Question 13

1 pts

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

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

## Question 14

1 pts

Calculate the formal charge on N in the molecule NH<sub>3</sub>.

- 3
- 0
- 2
- 1

## Question 15

1 pts

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



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

## Question 16

1 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?



- 89 g/mol
- 94 g/mol
- 17 g/mol
- 50 g/mol

## Question 17

1 pts

The following is the skeletal structure for a compound.



What is the molecular formula of this structure?

- C<sub>9</sub>H<sub>16</sub>
- C<sub>9</sub>H<sub>24</sub>
- C<sub>9</sub>H<sub>18</sub>
- C<sub>9</sub>H<sub>8</sub>

## Question 18

1 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<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>
- C<sub>8</sub>H<sub>9</sub>NO
- C<sub>8</sub>H<sub>9</sub>NO<sub>2</sub>
- C<sub>8</sub>H<sub>11</sub>NO<sub>2</sub>

## Question 19

1 pts

Which substance has polar covalent bonds?

- NH<sub>3</sub>
- Cl<sub>2</sub>
- O<sub>2</sub>
- Ca<sub>2</sub>C

## Question 20

1 pts

Which substance has nonpolar covalent bonds?

- NaCl
- CO
- NO<sub>2</sub>
- O<sub>2</sub>

## Question 21

1 pts

CHF<sub>3</sub> is (less, more) polar than CHI<sub>3</sub> because...

- less, the three polar C-F bonds are symmetrical and cancel the dipole moments.
- more, the C-H bond in CHF<sub>3</sub> is a nonpolar bond.
- less, the tetrahedral geometry decreases the polarity of C-F bonds.
- more, the C-F bonds are more polar than the C-I bonds.
- less, the C-H bond in CHF<sub>3</sub> is a nonpolar bond.

## Question 22

1 pts

Consider the Lewis Structures of CO<sub>2</sub> and CH<sub>3</sub>OH. Compared to the carbon-oxygen bonds in CO<sub>2</sub>, the carbon-oxygen bond in CH<sub>3</sub>OH are...

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

## Question 23

1 pts

Which is the correct order of increasing bond strength?

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

## Question 24

1 pts

Draw the Lewis structures for O<sub>2</sub> and O<sub>3</sub>. Why does it take more energy to break apart the bond in O<sub>2</sub>?

- The bond length in O<sub>2</sub> is greater than the bond length in O<sub>3</sub>
- The bond order in O<sub>2</sub> is greater than the bond order in O<sub>3</sub>
- The bond order in O<sub>3</sub> is greater than the bond order in O<sub>2</sub>