HW06 - Bonding & Energy Transfer

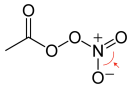
1 5 points

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

- O_3
- CH_2O
- NO_3^-
- SF_2

2 5 points

Consider the compound peroxyacetylnitrate, an eye irritant in smog.

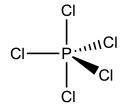


Predict the indicated bond angle.

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

3 5 points

What is the shape of phosphorus pentachloride?



- trigonal planar
- trigonal planar
- octahedral
- tetrahedral
- trigonal bipyramidal

4 5 points

Referring to the phosphorus pentachloride molecule shown above, what is the bond angle between a chlorine in the axial position and a chlorine in the equatorial position?

- 120˚
- 360˚
- 109.5˚
- 90˚
- 180˚
- 45˚

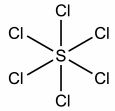
5 5 points

Referring again to phosphorus pentachloride, what are the bond angles between the two axial chlorine atoms?

- 90˚
- 180˚
- 109.5˚
- 120˚

6 5 points

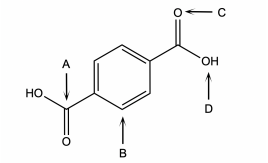
What is the shape of sulfur hexachloride?



- octahedral
- tetrahedral
- trigonal bipyramid
- trigonal planar
- hexahedral

7 4 points

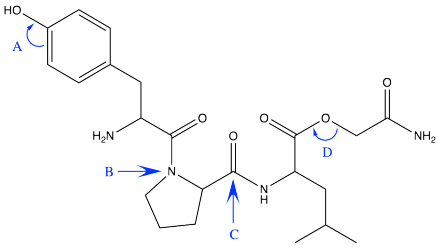
Which labelled bond angles are 120˚?



- C
- B
- D
- A

8 5 points

One of the cool things you should be able to do now is look at a big molecule and make detailed conclusions about unique groups within that molecule, such as determining the shape, bond angles, and the number of implied lone pairs. Answer the following questions about this molecule shown below. Fun fact, this molecule is just a small component of the hormone, oxytocin. Oxytocin is secreted as a result of social bonding and promotes feelings of closeness to others.



The bond angle around the carbon labeled A is choose your answer... .

The electronic geometry around the nitrogen labeled B is choose your answer... .

The molecular geometry around the carbon labeled C is choose your answer... . The bond angle around the oxygen labeled D is choose your answer... . There are a total of choose your answer... lone pairs on this molecule.

9 5 points

What is the geometry around the left-most carbon in the molecule CH_2CHCH_3 ?

- linear
- trigonal pyramidal
- trigonal planar
- tetrahedral

10 5 points

What is the shape (molecular geometry) of $COCl_2$?

- T-shaped
- tetrahedral
- trigonal pyramidal
- trigonal planar

11 5 points

What is the molecular geometry of the nitrite ion, NO_2^- ?

- linear
- none of these
- bent
- trigonal pyramidal
- trigonal planar

12 5 points

A molecule has three bonds and one lone pair . What are the electronic and molecular geometries, respectively?

- trigonal planar, trigonal pyramid
- tetrahedral, trigonal pyramid
- tetrahedral, tetrahedral
- trigonal pyramid, tetrahedral
- tetrahedral, trigonal planar

13 5 points

Determine the molecular geometry of BrF_5.

This molecule exhibits "expanded valence," meaning it disobeys the octet rule that allows $S = N - A$ to work. You can try it out on your own or search the internet for the structure before determining the shape.

- Trigonal pyramidal
- Square pyramidal
- Octahedral
- Trigonal bipyramidal

14 5 points

About what percentage of Earth's dry (no water) atmosphere is able to absorb IR radiation?

- Roughly 50%
- Only gases in the mesosphere
- IR is absorbed evenly by all atmospheric gases
- Less than 1%
- 1%

15 4 points

Select the molecules that are capable of absorbing IR radiation.

- [ ] CO_2
- [ ] Ar
- [ ] H_2O
- [ ] $CF_3CH_2CF_3$
- [ ] CH_4
- [ ] Ne
- [ ] O_2

16 4 points

What is the advantage of HFCs over the HCFCs that are used in present day appliances?

- HFCs do not contain ozone-depleting chlorine
- HFCs do not absorb in the IR region
- HFCs are less reactive than HCFCs
- HFCs are inflammable

17 4 points

Which of the following is a concern with long-term use of HFCs?

- They absorb IR radiation, resulting in global warming risks
- They will result in large-scale depletion of the ozone layer
- They are highly toxic
- They are flammable

18 4 points

Which of the following contribute significantly to the hole in the ozone layer?

- Chlorofluorocarbons
- Deforestation
- All of these are correct
- Automobile exhaust

19 4 points

The ozone layer is found in the...

- Troposphere
- Stratosphere
- Mesosphere
- Biosphere

20 2 points

You are running a chemical reaction using a catalyst. Which of the following statements is true?

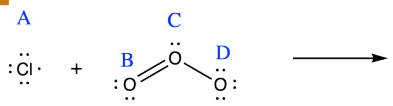
- The catalyst has no affect on the reaction mechanism.
- You should not use a catalyst because it will deplete your desired products.
- You will need to constantly add more catalyst because the chemical reaction will always rapidly deplete the catalyst.
- The catalyst will speed up your reaction.

21 4 points

The depletion of the ozone layer is catalyzed by chlorine. Which of the following best relates stratospheric chlorine to ozone levels?

- As chlorine levels increase, ozone levels increase
- As chlorine levels increase, the amount of ozone depletion cannot be predicted
- As chlorine levels increase, ozone levels decrease

22 5 points



Fill in each blank for the reaction shown above.

The formal charge on the chlorine radical labeled A is equal to choose your answer... .

The formal charge on the oxygen labeled B is equal to choose your answer... .

The formal charge on the oxygen labeled C is equal to choose your answer... .

The formal charge on the oxygen labeled D is equal to choose your answer... . This reaction is the first step of the choose your answer... in the atmosphere.