HW06 - Bonding & Energy Transfer

1 5 points

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

- ◯ SF_2
- ◯ CH_2O
- ◯ O_3
- ◯ NO_3^-

2 5 points

Consider the compound peroxyacetylnitrate, an eye irritant in smog.

Predict the indicated bond angle.

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

3 5 points

What is the shape of phosphorus pentachloride?

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

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?

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

5 5 points

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

- ◯ 180˚
- ◯ 120˚
- ◯ 109.5˚
- ◯ 90˚

6 5 points

What is the shape of sulfur hexachloride?

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

7 6 points

Which labelled bond angles are 120˚?

- ☐ A
- ☐ D
- ☐ C
- ☐ B

8 5 points

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

- ◯ tetrahedral
- ◯ linear
- ◯ trigonal pyramidal
- ◯ trigonal planar

9 5 points

Progesterone, an important hormone, is shown in Figure A. The molecular formula is $C_{21}H_{30}O_2$. In Figure B, the ketone on the five-carbon ring has been substituted with a hydroxyl group, and this small difference results in another hormone with very different biological effects. What is the chemical formula for the compound in Figure B?

Figure A

Figure B

- ◯ $C_{19}H_{26}O_2$
- ◯ $C_{21}H_{29}O_2$
- ◯ $C_{18}H_{24}O_2$
- ◯ $C_{20}H_{28}O_2$

10 5 points

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

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

11 5 points

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

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

12 5 points

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

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

13 5 points

Determine the molecular geometry of BrF_5.

- ◯ 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?

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

15 4 points

Select the molecules that are capable of absorbing IR radiation.

- ☐ CH_4
- ☐ H_2O
- ☐ Ne
- ☐ O_2
- ☐ Ar
- ☐ $CF_3CH_2CF_3$
- ☐ CO_2

16 5 points

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

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

17 5 points

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

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

18 5 points

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

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

19 5 points

The ozone layer is found in the...

- ◯ Mesosphere
- ◯ Biosphere
- ◯ Stratosphere
- ◯ Troposphere

20 5 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 decrease
- ◯ As chlorine levels increase, the amount of ozone depletion cannot be predicted
- ◯ As chlorine levels increase, ozone levels increase