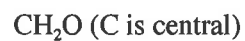


Organic, Bonding, Polarity, Practice Problems!

1. a. Draw the Lewis Dot structure for each of the following:



b. Determine the electron geometry and molecular geometry for each of the above ions/molecules.

c. Classify the first 5 molecules as polar or nonpolar. If polar, draw the net polarity arrow.
(You will need electronegativity values from WS 16.35)

d. For each compound below, determine whether it contains only covalent bonds, only ionic bonds, or both ionic and covalent bonds.



_____ Na_2O

_____ C_3H_8

_____ SF_4

_____ AlF_3

_____ NH_4Cl

_____ $\text{C}_{12}\text{H}_{22}\text{O}_{11}$

_____ PBr_3

_____ CCl_4 *

_____ $\text{Zn}_3(\text{PO}_4)_2$

_____ NF_3 *

_____ $\text{C}_3\text{H}_7\text{N}$

e. Draw pictures of all the substances with star (*) next to them. Show dot structures/ions/bonds/ whatever it has. Label ionic and/or covalent bonds (whatever type(s) it has) in each structure you draw.

(NaNO_2 , AgBr , CaSO_4 , BrCl , CCl_4 , NF_3)

2. a. Define electronegativity.

b. How do the electronegativity values relate to the periodic table?

c. Which element has the highest electronegativity, and what is the value?

d. For each pair, circle the element with the higher electronegativity:

(Do this without looking up any numbers – just use a periodic table!)

C or Ge

Na or S

Cl or P

S or As

Se or Te

Br or As

Te or Cl

N or Si

3. For each atom, indicate how many bonds, and how many lone pairs, the atom will typically have in an organic compound.

	C	H	N	O	F	Cl	Br	I
bonds	_____	_____	_____	_____	_____	_____	_____	_____
lone pairs	_____	_____	_____	_____	_____	_____	_____	_____

4. Draw the structure for each compound. You don't need to show Hydrogens attached to carbons, but show all other hydrogens, and show any lone pairs.

ethyl propyl ether

methyl ethyl butyl amine

pentyl amine

ethyl propyl amine

cycloheptane

hexanoic acid

ethanaldehyde

dibutyl ether

methanol

cyclononene

1,2 diiodo benzene

cyclooctanol

1,2,3,4 tetrafluorobenzene

3-nonyne

1-decene

2-heptanone

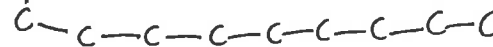
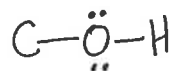
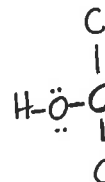
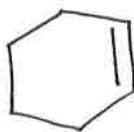
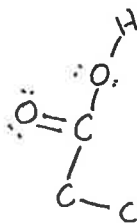
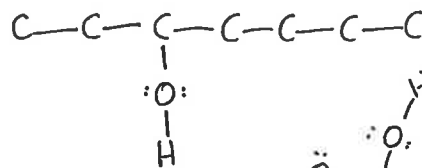
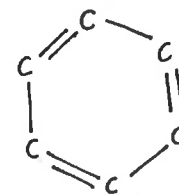
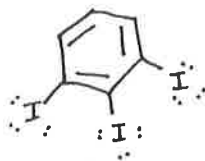
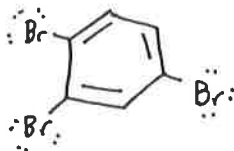
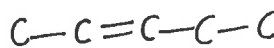
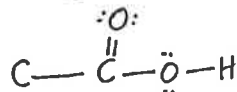
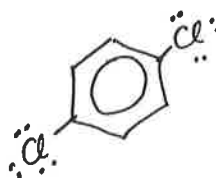
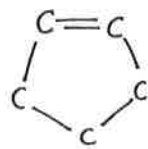
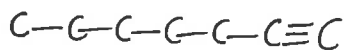
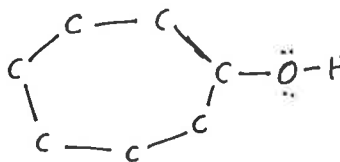
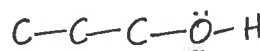
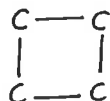
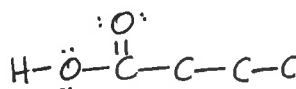
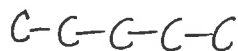
2-hexyne

heptanaldehyde

4-heptanol

bromocyclohexane

5. Name each of these compounds.



6. Several pairs of compounds are shown below. Which ones are pairs of isomers? Circle the ones that are.

methanol and ethanol

propanaldehyde and propanone

butanoic acid and 1-butanol

methyl propyl ether and diethyl ether

2-hexanol and 3-hexanol

hexane and cyclohexane

methyl ethyl propyl amine and pentyl amine

1,3 difluorobenzene and 1,4 difluorobenzene

ethyl amine and diethyl amine

7. Draw four possible isomers of $C_4H_{10}O$, and name each one.

8. Classify each bond as polar or nonpolar. You should be able to do this without an electronegativity chart.

C=O

C-O

C-N

C-C

C-H

N-H

O-H

9a. Draw a picture showing a solution of ethanol dissolved in water. Show several molecules (1 ethanol plus a few waters) and line up the molecules so that they are attracted to each other. Show $\delta +$ and $\delta -$ symbols.

b. Same question as 9a, except draw a solution of methyl amine dissolved in water.

10a. For each pair of compounds, circle the one that should be more soluble into water.

$C_4H_{10}O_2$ or C_6H_{14}

C_3H_8O or $C_{10}H_{22}O$

butyl amine or butane

an alcohol with 5 carbons or an alkyne with 5 carbons

benzene or propanaldehyde

ethanaldehyde or octanaldehyde

$C_{20}H_{40}O_2$ or $C_8H_{12}O_2$

dimethyl ether or dipentyl ether

methanol or heptanol

$C_4H_6O_2$ or $C_5H_{12}O$

$C_3H_{10}N_2$ or $C_7H_{17}N$

10b. For each pair of compounds, circle the one that should be more soluble into hexane.

Benzene or water

fat or sugar

$C_3H_8O_3$ or C_5H_{12}

10c. Consider the alcohols 1-propanol, 1-hexanol, and 1-nonanol.

Which of these would be the most soluble in water? the least soluble in water?

Which is most likely to be miscible with water?

11. For each problem, draw the structure for each compound listed, and then draw the structure of the molecules that would form when the two given compounds react!

a. 1-butanol + propanoic acid

b. 2-butanol + pentanoic acid

c. Ethanoic acid + 3-pentanol

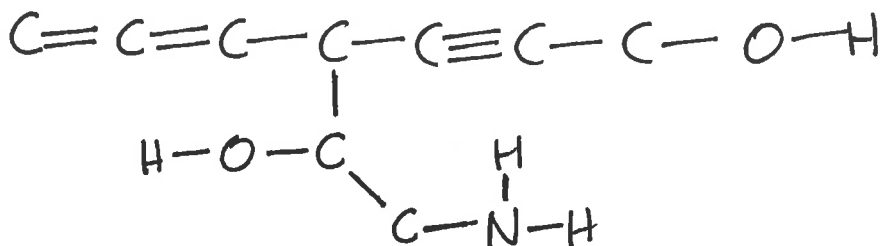
d. Methanoic acid + 1-hexanol

12. a. Draw the amino acids tyrosine, lysine, and glutamic acid (look them up on the chart on WS 16.7)

b. Show how the amino acids can bond together via "dehydration synthesis." Draw the molecule that forms.

13. Consider the molecule below.

- Add hydrogens and lone pairs wherever they are needed.
- Determine the bond angle at each carbon, oxygen, or nitrogen.



14. Consider the pictures of aldosterone (a hormone), lidocaine (an anaesthetic, often used by dentists), and capsaicin (in peppers and pepper spray).

- Identify and Label all functional groups in each compound.
- Draw polarity arrows on any polar bonds, and show any $\delta+$ and $\delta-$ symbols.

