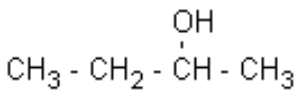
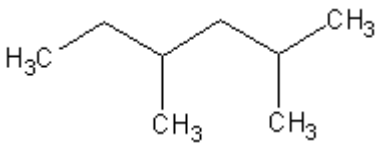
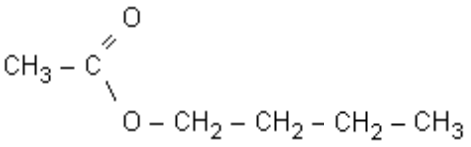
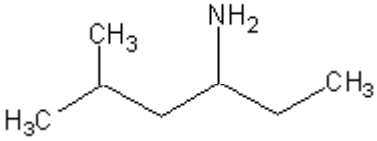
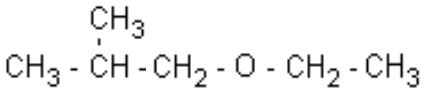
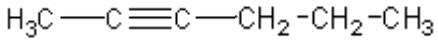
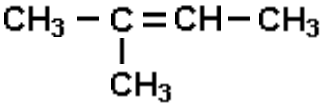
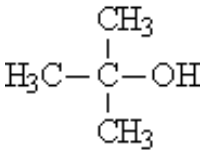
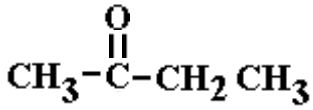
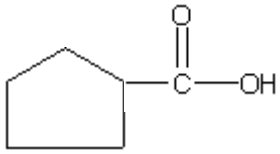
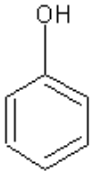
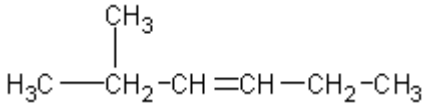
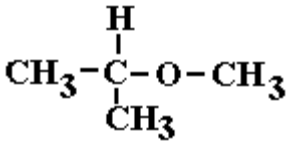
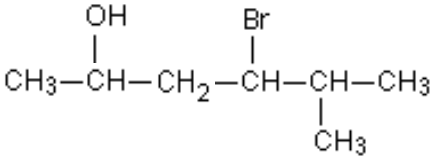
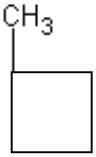
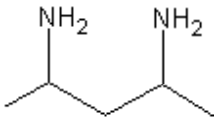
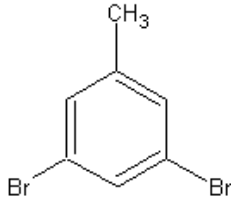
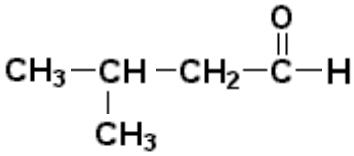
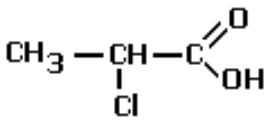
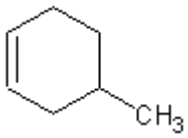
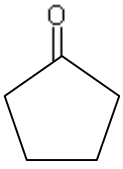
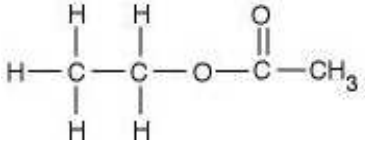
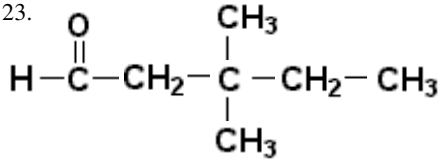
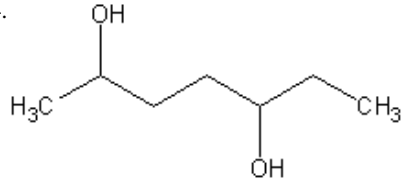
Review #3: Naming, Physical Properties and Reactions of Organic Compounds (Chap.1 & 2)

1. Name the following organic compounds using their IUPAC names. Identify the type (family) of each compound.

1. 	2. 	3. 
4. 	5. 	6. 
7. 	8. 	9. 
10. 	11. 	12. 
13. 	14. 	15. 
16. 	17. 	18. 
19. 	20. 	21. 
22. 	23. 	24. 

2. Referring to the "numbers" of each molecule (1, 2, 3 etc) on the first page, identify the following:

a) all secondary alcohols: _____
b) all aromatic compounds: _____
c) all unsaturated aliphatic hydrocarbons: _____
d) all tertiary alcohol(s): _____
e) all saturated hydrocarbons: _____
f) all substances that turn Br_2 (l) colourless _____

3. On the chart on the first page:

a) write the letter "H" in the top right-hand corner of all compounds that are capable of H-bonding
b) put a star (*) beside the compound in each **row** that will be the most soluble in water
c) put a "‡" sign beside the compound in each **row** with the **lowest** boiling point

4. Draw the structural formula for each of the following molecules. Identify the family of each.

a) 2,2,4-trimethylheptane
b) 4,5-diethyl-2-heptanone
c) meta-dichlorobenzene
d) 2-pentanamine
e) 2-ethylbutanoic acid
f) butyl methanoate
g) 1,1,3-trimethylcyclobutane
h) 1,4-dichloro-3-ethylpentane
i) 4,4-dimethyl-2-pentanol
j) 1,1-dimethyl-3-propylcyclohexane
k) 3-chloro-4-methyl-2-hexene
l) 1,4-dichloro-2-methylbenzene
m) ethyl propanoate
n) 2-propoxy butane
o) 3,3-dichlorobutanoic acid
p) 3-methyl-3-hexene
q) 2-ethoxypropane
r) 4,4-difluoropentanal

5. Draw three possible isomers with the chemical formula $C_4H_{10}O$. Name each compound.

- Compare the physical properties of each isomer in terms of melting point and solubility in water.

6. Draw three possible isomers with the chemical formula C_6H_{10}. Name each compound.

- Write the balanced chemical equation for the combustion reaction of any C_6H_{10} compound.

7. Reactions of organic substances:

a) describe two tests for saturation (chemical tests that can be used to see if an organic compound contains any double [C = C] or triple [C ≡ C] bonds)
b) describe a chemical test that can be used to distinguish a 3° alcohol from a 1° alcohol
c) draw and name the products that form (remember Markovnikov's rule) when 1-butene reacts with:
   i) liquid bromine
   ii) hydrochloric acid
   iii) hydrogen gas
   iv) water
   v) $KMnO_4$ (and NaOH)

   What is the name of this **type** of reaction? _____
   What is the name of the **type** of reaction that is the reverse of these reactions? _____
d) draw and name one possible product that will form when butane reacts in a substitution reaction with:
   i) hydrochloric acid
   ii) nitrous acid
e) draw and name the products that form (if any) when these substances are oxidized by an oxidizing agent [O]:
   i) 1-butanol
   ii) 2-butanol
   iii) butanal
   iv) 2-methyl-2-propanol
   v) 2-pentene with $KMnO_4$ (and NaOH)

   Explain why these reactions are considered to be oxidation reactions.
f) draw and name the products that form when these substances react in the presence of heat and H_2SO_4
   i) methanol and propanoic acid
   ii) 1-propanol and methanoic acid
   iii) ethanol and butanoic acid
   iv) ethanol and 1-propanol

   What are two names for this **type** of reaction?
   _____ and _____