Name _____

Chem 150 - Spring 2015
Exam II - Practice Exam

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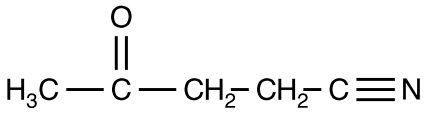
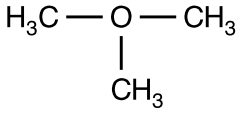
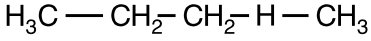
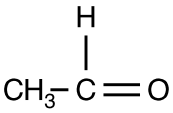
1. Label each of the carbon atom in the molecule shown below as have having either a *tetrahedral* (Tet), *trigonal planar* (Trig) or *linear* (Lin) geometry.

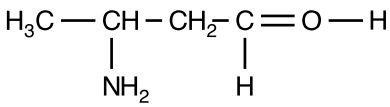


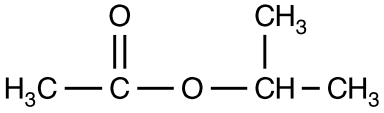
2. Cross out the molecules that are unlikely to exist



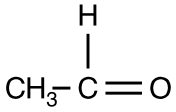








3. Classify each of the following molecules based on the functional group, if any, that they contain, for example, *alkane, alcohol, etc.*



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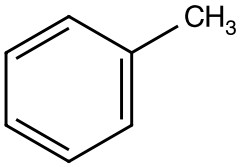

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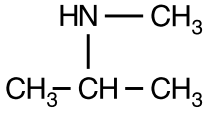

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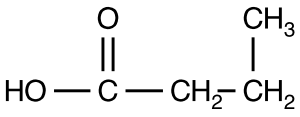

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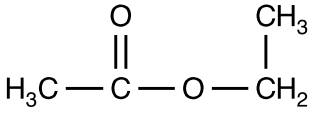

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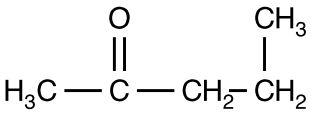

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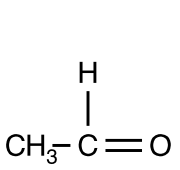
4. Draw condensed structures for the following alkenes:

a. 1-butene	b. *trans*-2-methyl-3-pentene	c. *cis*-4-methyl-3-heptene

5. Name each of the following molecules.



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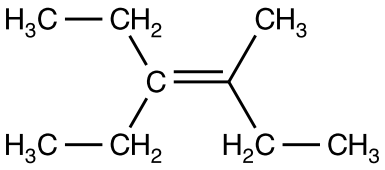

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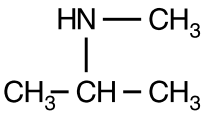

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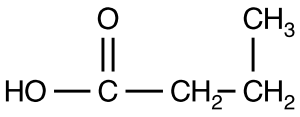

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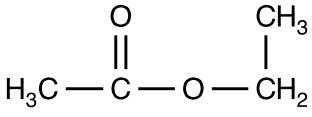

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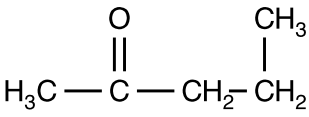

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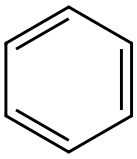
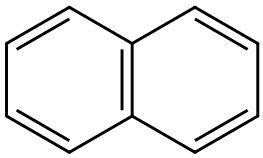
6. One of the following compounds is a liquid at room temperature, while the other is a solid. Identify which is which and state the evidence you have for your claim.



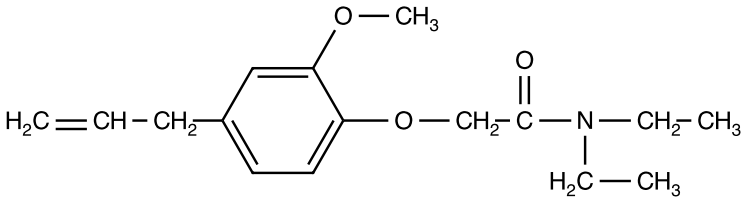
Benzene



Naphthalene

7. Which of the following pairs of compound are *isomers*?
   a. hexane and 2-methylpentane
   b. 1-hexene and cyclohexane
   c. 1-hexene and cyclohexane
   d. *cis*-3-heptene and *trans*-2-heptene
   e. pentane and 2-methylpentane
   f. 2-ethylhexane and 2,3-dimethylpentane

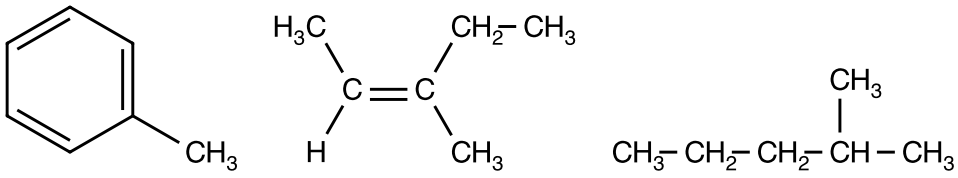
8. The structure of the anesthetic *Estil* is shown below.



Estil

   a. Circle and label each of the functional groups in Estil.
   b. Label each hydrogen bond *donor* in Estil with a "D".
   c. Label each hydrogen bond *acceptor* in Estil with an "A".

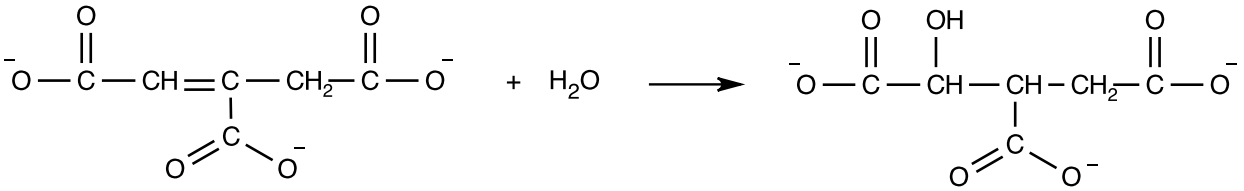
9. From the molecules below



a. Pick the one that can undergo an *hydration reaction* and use it to write a balanced chemical equation for this reaction. Be sure to include all of the possible products.

b. Name each of the organic reactants and products in the reaction.

10. The following reaction takes place in the citric acid (Krebs) cycle

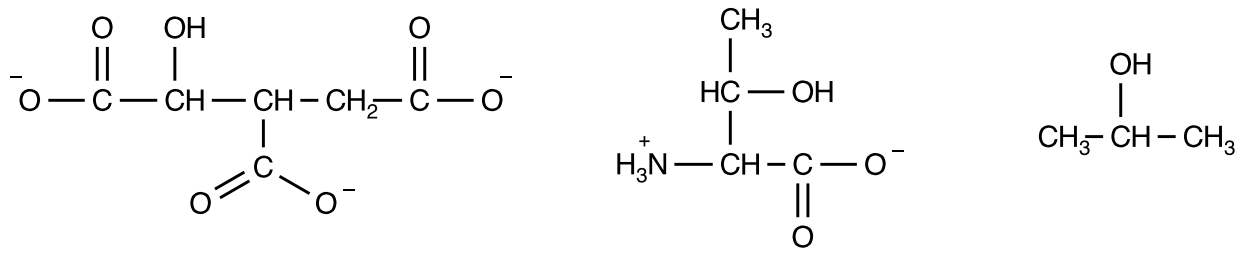


Aconitate Isocitrate

a. If this same reaction is carried out in a test tube there are two possible products that form,, Draw the structural formula for other possible product.

b. However, when this reaction is carried out in a living cell only the isocitrate is formed. Explain why this is so.

11. Circle all of the *chiral carbons* in the following molecules



12. Draw structural formulas for the following named molecules.

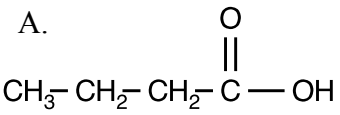
2-heptyne	4-ethyl-2-methyloctane	cyclobutanol
3-methyl-2-pentanol	3-methylpentanal	3-methyl-2-pentanone
ethyl methyl amine	diethyl ether	potassium butanoate
2-methylpropanoic acid	methylammonium bromide	dimethylammonium pentanoate

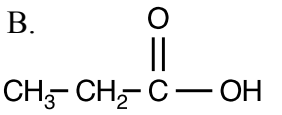
13. Ethanol is a biofuel that is now commonly mixed with gasoline. A car engine converts both of these through the combustion reaction to CO_2 and water.

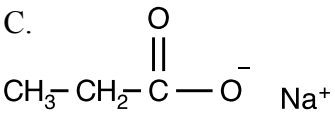
    a. One of the major components of gasoline is octane. Write a balanced chemical equation for the complete combustion of octane.

    b. Write a balanced chemical equation for the complete combustion of ethanol.

14. Given the structural formulas for the three molecules shown below,

A. 

B. 

C. 

a. Provide names for each of the compounds.

b. Using the lettered labels, arrange the molecules in the order of their boiling points, from low to high.

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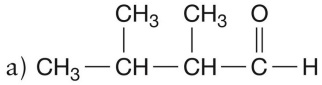
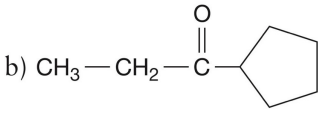
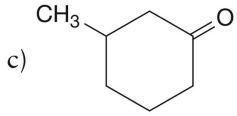
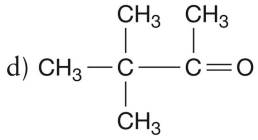
15. Draw and the structures for the following carbonyl compounds when they are completely reduced.

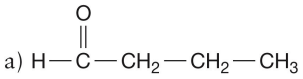
a) 

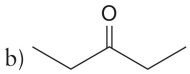
b) 

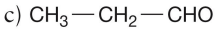
c) 

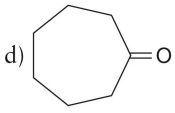
d) 

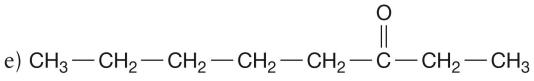
16. Name the following molecules,

a) 

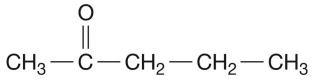
b) 

c) 

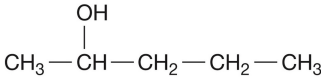
d) 

e) 

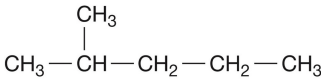
17. One of the following compounds boils at 119°C, one at 102°C, and remaining one at 60°C. Match each compound with its boiling point.



2-Pentanone

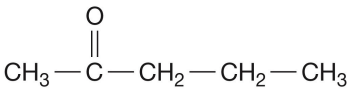


2-Pentanol

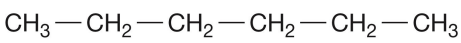


2-Methylpentane

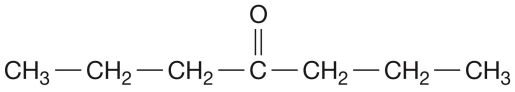
18. The solubilities of the following three compounds are 40 g/L, 4.6 g/L, and 0.14 g/L. Match each compound with its solubility.



2-Pentanone

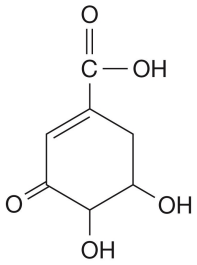


Hexane



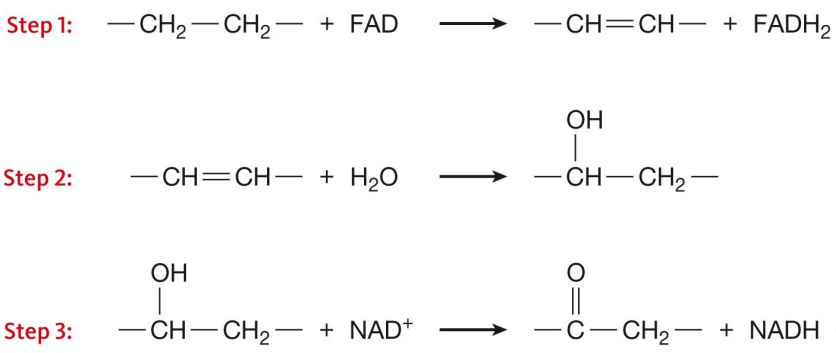
4-Heptanone

19. Phenylalanine is one of the amino acids used to make proteins. It is made by bacteria using a sequence of reactions that includes the reduction of 3-dehydroshikimic acid. Because this reaction is carried out by an enzyme bacteria are able to specifically reduce only the ketone group. Draw the structure of the product of this reduction.



3-Dehydroshikimic acid

20. In class we discussed that the following sequence of three reactions is common to a number of metabolic pathways,



For example, the sequence is used in the degradation of fatty acids,

Write balanced chemical equations for each of reactions in this pathway and circle any chiral carbons that are formed.

a.

b.

c.

21. Using structural formulas, write the balanced chemical reaction equation for the ionization of each of the following molecules when placed in water

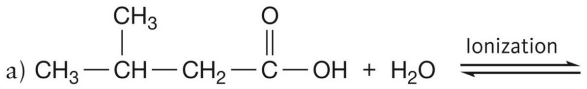
a. diethyl amine

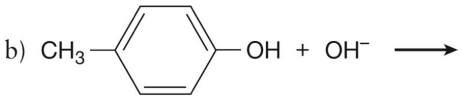
b. pentanoic acid

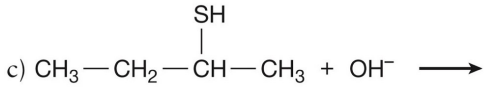
22. Between propyl amine and heptyl amine,

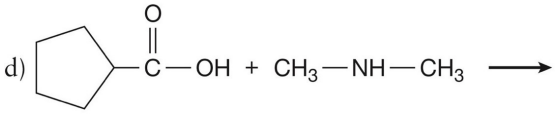
a. Which is predicted to have the higher boiling point?
b. Which is predicted to have the higher so solubility in water?
c. Which is predicted to smell worse?

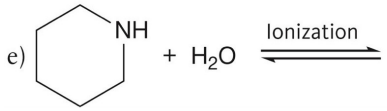
23. Complete the following reaction equations

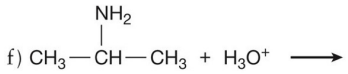
a) 

b) 

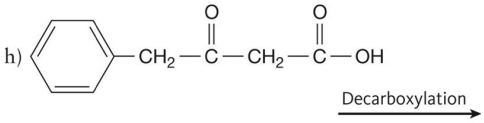
c) 

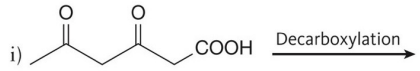
d) 

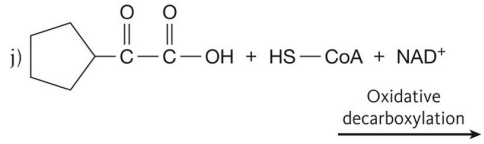
e) 

f) 

g) 

h) 

i) 

j) 

k)