Name:_____

Organic Chemistry Exam A

Multiple Choice
You should know/be able to

1. Understand how carbon bonds and what combination of bonds it is able to form
2. The difference between aliphatic, aromatic, cyclic, alkanes, alkenes and alkynes
3. The simplest alkane, alkene, alkyne, cyclic and aromatic
4. What a homologous series is
5. Alkanes primary use
6. Identify saturated and unsaturated hydrocarbons from their structural diagram, condensed structural formula, chemical formula and type
7. Name alkanes, alkenes and alkynes
8. Identify consititutional and geometic isomers of certain molecules
9. Know the functional groups that contain carbonyl and hydroxyl groups
10. Polymers… stuff

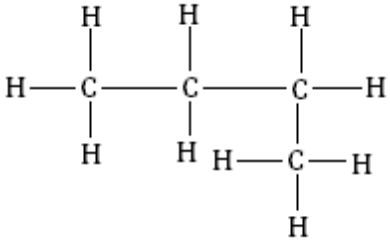
Short answer:

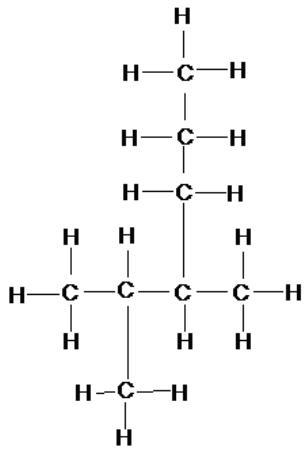
1. Explain how the valence structure of carbon leads to the large number and diversity of organic compounds in nature:

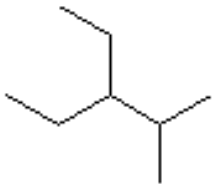
2. Compare the advantages and disadvantages of different models used to represent organic molecules: (I will list the models I'd like you to compare)

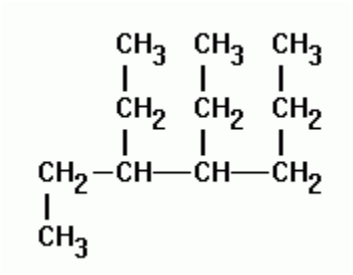
3. Name the following hydrocarbons using the IUPAC nomenclature rules

a.  _____

b.  _____

c. 

d. 

e. 

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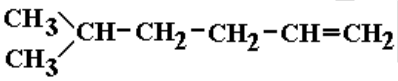
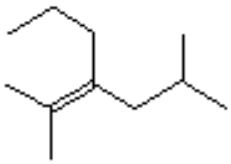
g. 

h. 

4. For the following compounds, draw the structural formula, the line drawing, the chemical formula and give the proper name if needed.
   a. 1,3,5-trimethylpentane

b. 3-ethyl-2,3-dimetyl-1,4-dipropylpentane

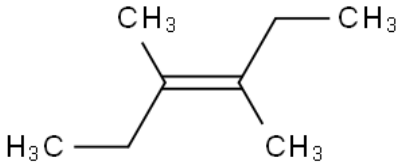
c. 4-hexyne

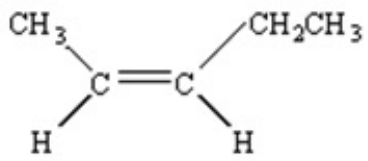
d. 1-ethyl-3,4-dimethyl-5-hexyne

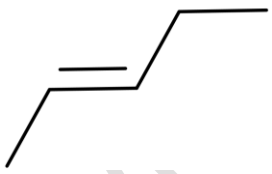
5. Draw the line formula for the 9 constitutional isomers of heptane

6. Draw a concept map to show how the following vocabulary words are related: isomers, constitutional isomers, geometric isomers, stereoisomers, cis-trans isomers and enantiomers.

7. Name each of the following using cis-trans conventions:

a. 

b. 

c. 

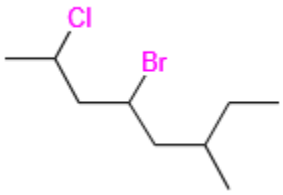
8. Draw the cis and trans structural formulas for the following alkenes.
   a. 4-nonene

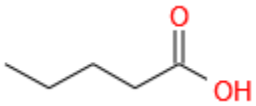
9. Which compound has an asymmetric carbon atom? Circle the asymmetric carbon(s) (draw the molecule if not provided)

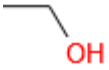
a. $CH_3\underset{\underset{Cl}{|}}{C}HCHO$ *or* $CH_3\underset{\underset{CH_3}{|}}{C}HOH$

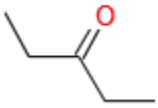
a. 2,2-dimethylpentane *or* 2,3,4,-trimethylhexane

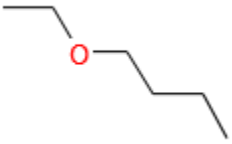
10. For each compound below, identify their functional groups, determine the type of compound and write the correct IUPAC name.

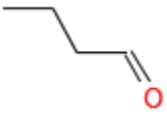
a. 

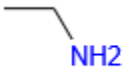
b. 

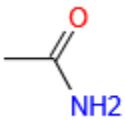
c. 

d. 

e. 

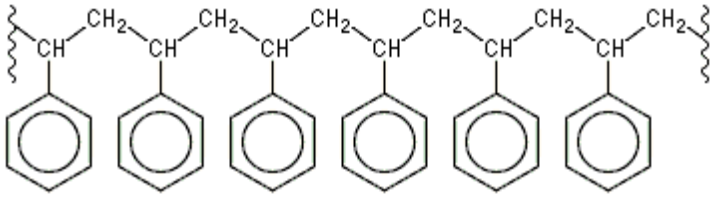
f. 

g. 

h. 

11. Draw the structural formula, line drawing and write the names of the first 3 cyclic alkanes:

12. Circle the monomer in the following polymer:



polystyrene

13. In our human polymer chain we created in the hallway, what would be the monomers of our polymer analogy?

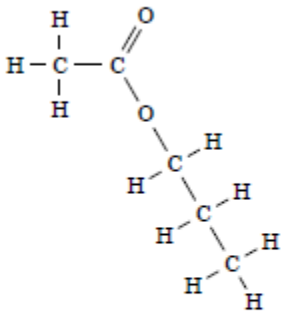
Extras that may be added: (might also add a few T/F Q's)

9. Which class of organic compound contains one triple bond?

A. alkyne
B. alkene
C. alkane
D. aromatic

How many hydrogen atoms are found in a molecule of decane?

12. Consider the following molecule:



To which class of organic compounds does this molecule belong?

A. ester
B. ether
C. ketone
D. organic acid

11. Consider the following organic compound.

$$CH_3 - CH = CH - CH_2 - CH_2 - CH_3$$

Which structural formula does **NOT** represent a completely different isomer?

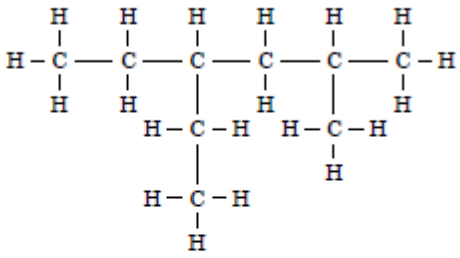
A. $CH_3 - CH = CH - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_3$

B. $CH_3 - CH_2 - CH_2 - CH = CH - CH_3$

C. $CH_3 - CH_2 - CH = CH - CH_2 - CH_3$

D. $CH_2 = CH - CH_2 - CH_2 - CH_2 - CH_3$

10. Consider the following structure.



What is the IUPAC name of the molecule?

A. 2 – methyl – 4 – ethylhexane
B. 3 – ethyl – 5 – methylhexane
C. 5 – methyl – 3 – ethylhexane
D. 4 – ethyl – 2 – methylhexane