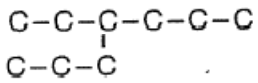
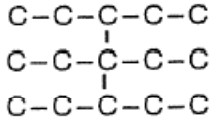
Organic Naming

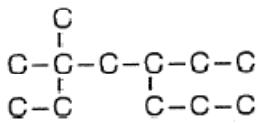
Name - _____

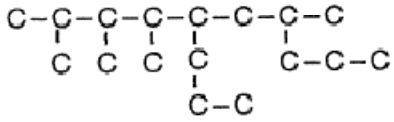
Alkanes and Alkyl Groups

1.) Determine the number of carbon atoms in the longest chain of each of the following, and name the parent hydrocarbon represented by the longest chain.

(a) 

(b) 

(c) 

(d) 

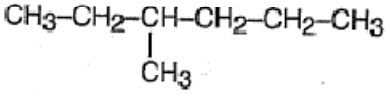
a.)

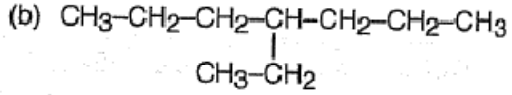
b.)

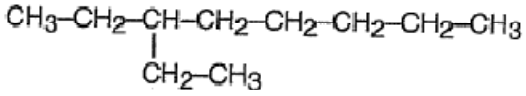
c.)

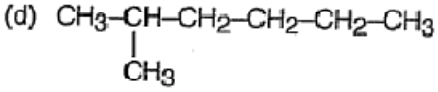
d.)

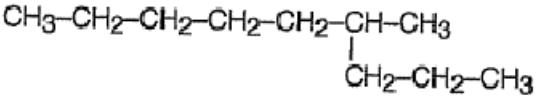
2.) Name the following hydrocarbons. Care: e and f are tricky!

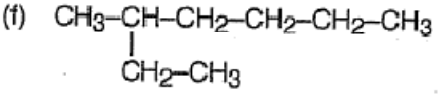
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

a.)

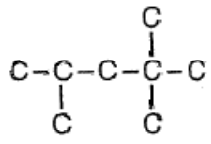
b.)

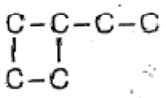
c.)

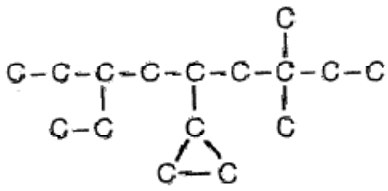
d.)

e.)

3.) Re-write the following structures to show the hydrogens attached.

(a) 

(b) 

(c) 

a.)

b.)

c.)

4.) Draw the following hydrocarbons. Include all hydrogens.

(a) 3-methylhexane
(b) 4-ethyloctane
(c) 2-methylpentane
(d) 4-propylnonane
(e) 3-ethylheptane
(f) 5-propyldecane

a.)

b.)

c.)

d.)

e.)

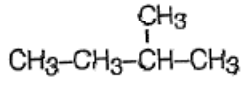
f.)

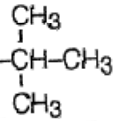
(b) 4-ethyloctane

5.) What is wrong with each of the following? (You may have to sketch the molecule to see the error in some cases.)

(a) 6-methylheptane

(b) 1-ethylbutane

(c) 

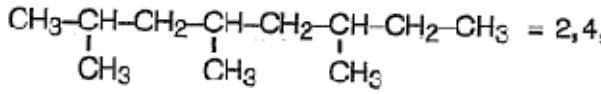
(d) 

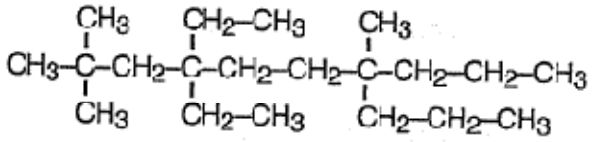
a.)

b.)

c.)

d.)

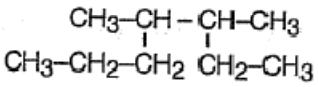
6.)  = 2,4,6–trimethyloctane

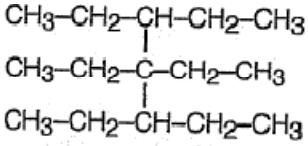


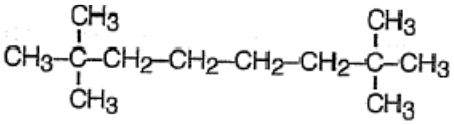
= 4,4–diethyl–2,2,7–trimethyl–7–propyldecane

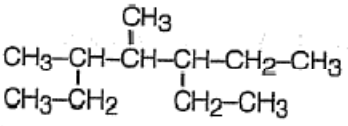
Count up the number of carbons and hydrogens in the two example molecules above. The general formula for a simple straight–chain hydrocarbon (methane, ethane, etc.) is C_NH_{2N+2}. What is the general formula for a branched hydrocarbon?

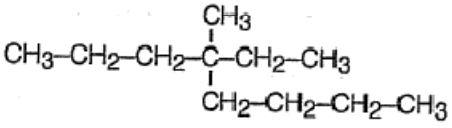
7.) Name the following molecules.

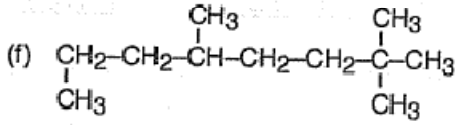
(a) 

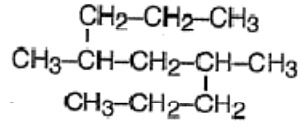
(b) 

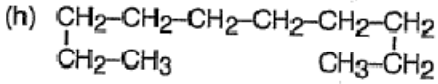
(c) 

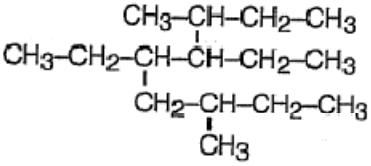
(d) 

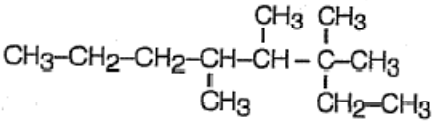
(e) 

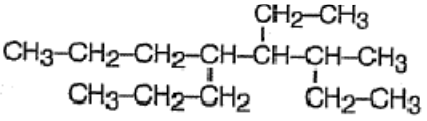
(f) 

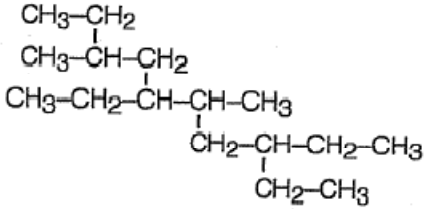
(g) 

(h) 

(i) 

(j) 

(k) 

(l) 

8.) Sketch the following molecules.

(a) 3–ethyl–2,3–dimethylhexane
(b) 2,2–dimethyl–5,6–dipropylnonane
(c) 4–ethyl–3–methyl–5–propyloctane
(d) 2,2,3,3–tetramethylpentane
(e) 3,4–diethylhexane
(f) 5–butyl–6,6–diethyl–3,3,7–trimethyldecane
(g) dimethylpropane (why were no numbers used?)
(h) 4–ethyl–2–methyloctane
(i) hexamethylpentane
(j) 3,6–diethyl–4–methyl–5–propyloctane

a.)

b.)

c.)

d.)

e.)

f.)

g.)

h.)

i.)

j.)

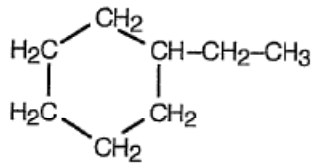
9.) Write the condensed structure and name for the three structural isomers having the molecular formula C_5H_{12}.

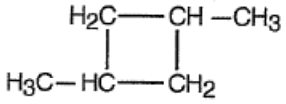
Write the condensed structure and name for the two structural isomers that involve a single methyl group attached to hexane.

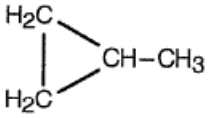
Write the condensed structure and name of the four structural isomers that involve two methyl groups attached to pentane.

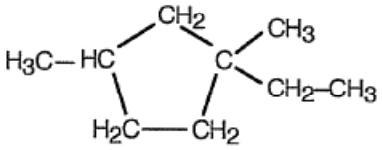
How many isomers of C_8H_{18} contain no side chains other than a single methyl group?

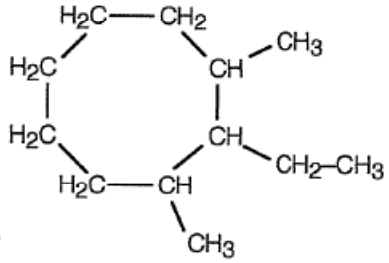
10.) Name the following compounds.

(a) 

(b) 

(c) 

(d) 

(e) 

11.) Sketch the following compounds.

(a) 1,2–dimethylcyclobutane
(b) 1,1,2–trimethylcyclopropane
(c) 1,3–dipropylcyclopentane
(d) propylcyclopropane
(e) 1,3–diethyl–2,2–dimethylcyclooctane
(f) 1,2,4–triethylcycloheptane

a.) b.)

c.) d.)

e.) f.)

12.) Draw the condensed structure for the following.

(a) 1–hexene (c) 3–decene (e) 2–octene
(b) 4–nonyne (d) 2–heptyne (f) 1–octyne

a.) b.) c.)

d.) e.) f.)

13.) Name the following.

(a) $CH_3–CH_2–CH=CH–CH_2–CH_3$

(b) $CH_3–CH_2–CH_2–CH_2–CH_2–C\equiv CH$

(c) $CH_3–CH_2–CH_2–C\equiv C–CH_2–CH_2–CH_2–CH_2–CH_3$

(d) $CH_3–CH_2–CH=CH–CH_2–CH_2–CH_3$

14.) Draw the condensed structure for each of the following.

(a) 4–ethyl–3–methyl–2–hexene
(b) 3–methyl–4–octyne
(c) 1–ethyl–1–cyclononene
(d) 3–ethyl–4–methyl–1–hexyne
(e) dimethyl–2–butene
(f) 3,6–dimethyl–1–cyclohexene
(g) cyclopropyne
(h) 1,3–dimethyl–1–cyclopentene

a.)

b.)

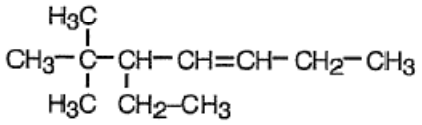
c.)

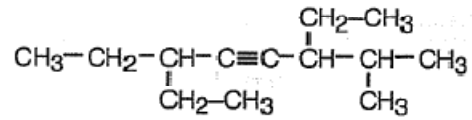
d.)

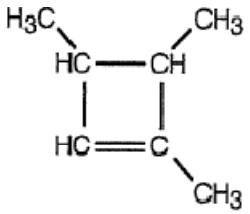
e.)

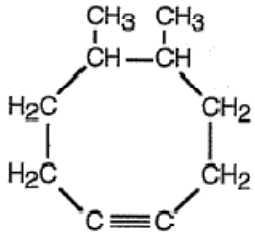
f.)

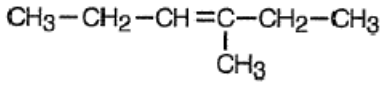
15.) Name the following compounds.

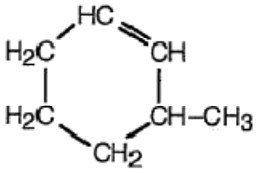
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

a.)

b.)

c.)

d.)

e.)

f.)