



## Worksheet 7.viii Organic Chemistry Unit Review Package

### Generalized Organic Chemistry Naming Procedure

*Grouped into three general phases.*

1. *Identification phase (finding all important/correct information)*
2. *Numbering phase (finding location of all the pieces)*
3. *Naming phase (writing the name)*

#### Parent Chain Identification Phase

1. Find the functional group with the highest seniority. This is the “parent functional group”. Use its suffix.
  - For us, the highest seniority you’re tested on are alkenes or alkynes
2. Find the longest hydrocarbon chain, containing as many parent functional group as possible.
  - If more than one possible way, choose the one with the most = or  $\equiv$  bonds
  - If no functional groups except = or  $\equiv$ , choose the one with most = or  $\equiv$
  - If no = or  $\equiv$ , the longest possible chain.
  - This is the “parent chain”
3. Count the number of carbons in the parent chain. Take note of its prefix.

#### Numbering Phase:

1. Number the parent chain in both directions.
2. Choose the correct numbering by identifying:
  - a. Lowest numbers for the parent functional group.
  - b. If tied, lowest numbers for = or  $\equiv$  bonds
  - c. If tied, lowest numbers for = bonds
  - d. If tied, lowest numbers to side chains or secondary functional groups
  - e. If tied, by alphabetical order of side chains or secondary functional groups.
3. Assign these numbers to all side chains and secondary functional groups.
4. If there are multiple copies of the same side chain (or secondary functional group), put a prefix in front of its name. (Di/tri/tetra)

#### Naming Phase:

1. Write down all side chains and alphabetical order with locants.
  - Always separate numbers and words with dashes (-)  
Eg. 1-chloro-2,3-diethyl- blah blah blah.
  - Cyclo counts for alphabetical order. Di/tri/tetra does not count in alphabetical order.
2. Write prefix for parent chain (number of carbons)
3. Write down all double or triple bonds in parent chain with locants.
  - Double bonds: “-ene”
  - Triple bonds: “-yne”
  - If all single bonds, write “-ane”



## Test Contents

You will be required to know:

- Prefix for the first 10 carbons (meth-, eth-, prop-, but-... and so on)
- The three ways to draw organic compounds (structural, condensed structural, carbon skeleton), and to draw them correctly (correct number of bonds on carbons)
- General formula for alkanes, alkenes, and alkynes.
- The importance of carbon in organic chemistry.
- How to draw and name unbranched and branched alkanes using proper naming rules
- How to draw and name branched and unbranched alkenes **OR** alkynes
- How to draw and name cyclic alkanes, cyclic alkenes, and cyclic alkynes, with branches.
- Recognize and name benzene-containing compounds.
- How to name and draw alkyl halides.
- Recognize alcohol, ether, aldehyde, ketone, carboxylic acid, ester functional groups in organic compounds.
- Define and compare/contrast structural isomer, and geometric isomer
- Identify or draw examples of structural and geometric isomers
- Identifying cis/trans isomers when given a picture of an organic compound

You will be given the following information:

- A list of the following functional groups: alcohol, ether, aldehyde, ketone, carboxylic acid, ester. (**not** the general structure)

You will **not** be required to know:

- How to draw and name compounds with double bonds and triple bonds together in the same molecule.
- How to recognize amines and amides.
- How to name and draw alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amines, and amides.
- Optical isomers
- Naming cis/trans isomers

### Test Structure (~34 marks total) **\*\*SUBJECT TO CHANGE\*\***

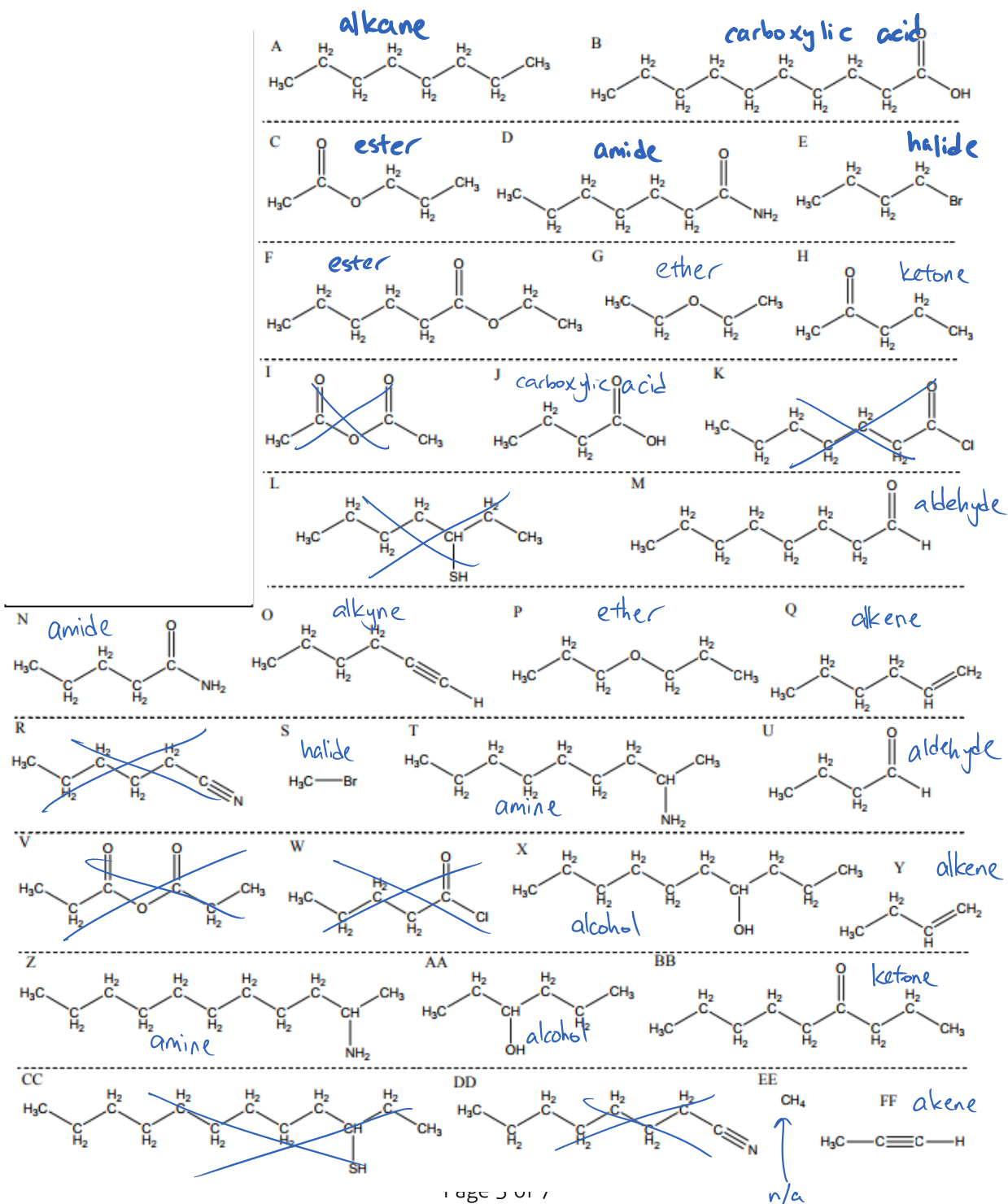
- ~12 multiple choice questions (general knowledge, functional groups, simple naming)
- Drawing/naming compounds
- Identifying functional groups
- Drawing isomers

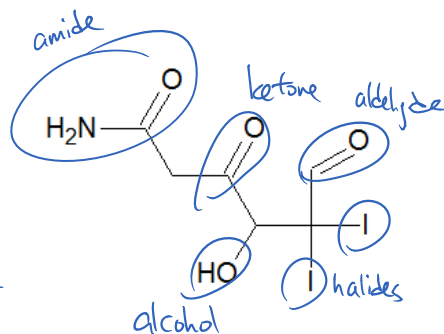
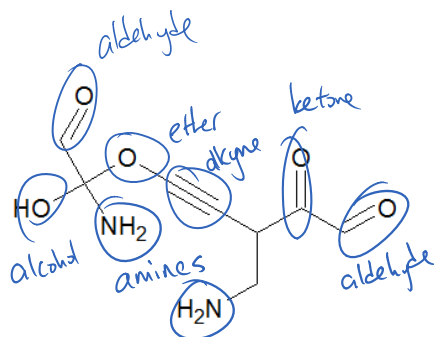
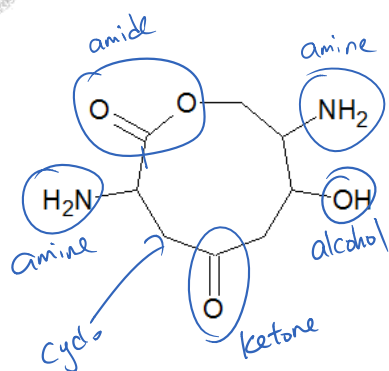


## Review Questions

1. For the following hydrocarbons, circle and label the following functional groups.

- alkane
- alkene
- alkyne
- alkyl halide
- alcohol
- aldehyde
- ketone
- ether
- ester
- carboxylic acids
- amine
- amide



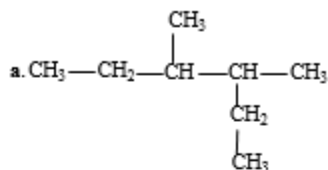


see other  
answer  
package

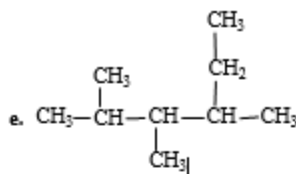
1. Draw and name the nine structural isomers of hexane ( $C_6H_{14}$ )
2. Draw all the structural isomers of  $C_5H_{10}$ . (Hint: there is either one double bond OR one ring; there are 12 isomers total)
3. What is the difference between structural isomers and geometric isomers?
4. Draw the following structures below and find all the mistakes in the structure/name.
  - a. 2-chloro-2,4-dibutylhex-1,3-diyne.
  - b. 6-fluoro-2,3,3-triiodocyclohex-3-ene.

5. Name the following compounds.

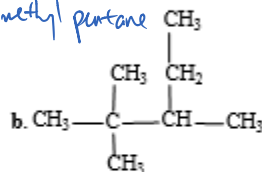
3,4-dimethylhexane



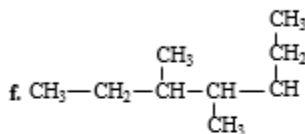
2,3,4-trimethylhexane



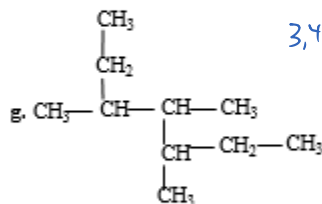
2,2,3-trimethylpentane



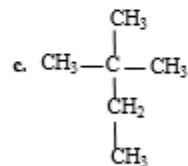
3,4-dimethylheptane



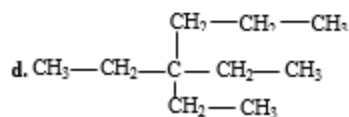
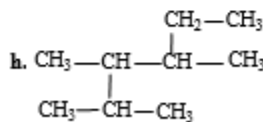
3,4,5-trimethylheptane



2,2-dimethylbutane



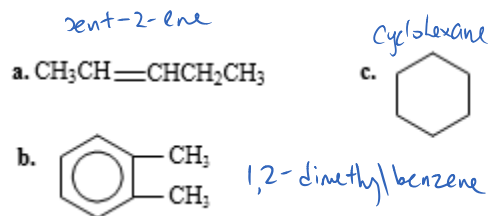
2,3,4-trimethylhexane



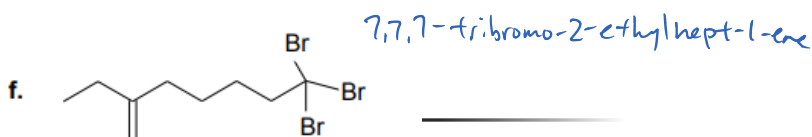
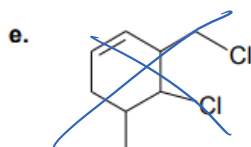
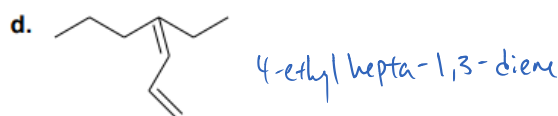
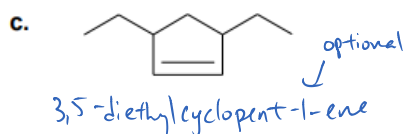
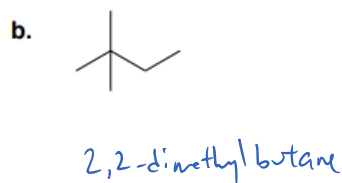
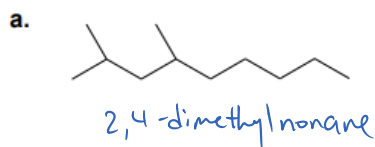
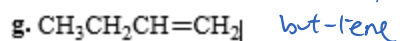
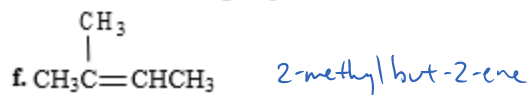
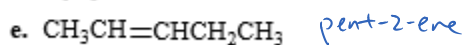
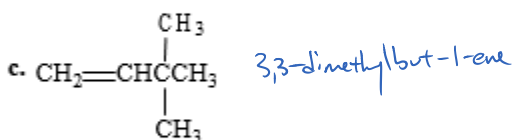
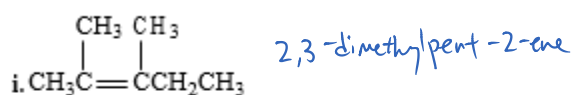
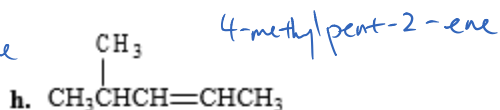
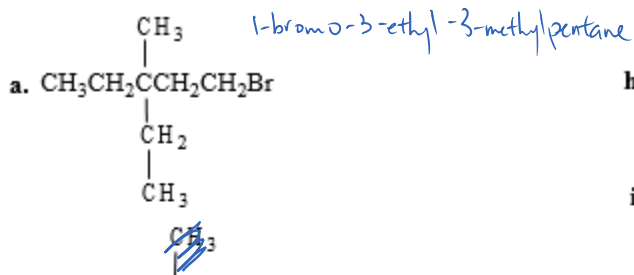
3,3-diethylhexane

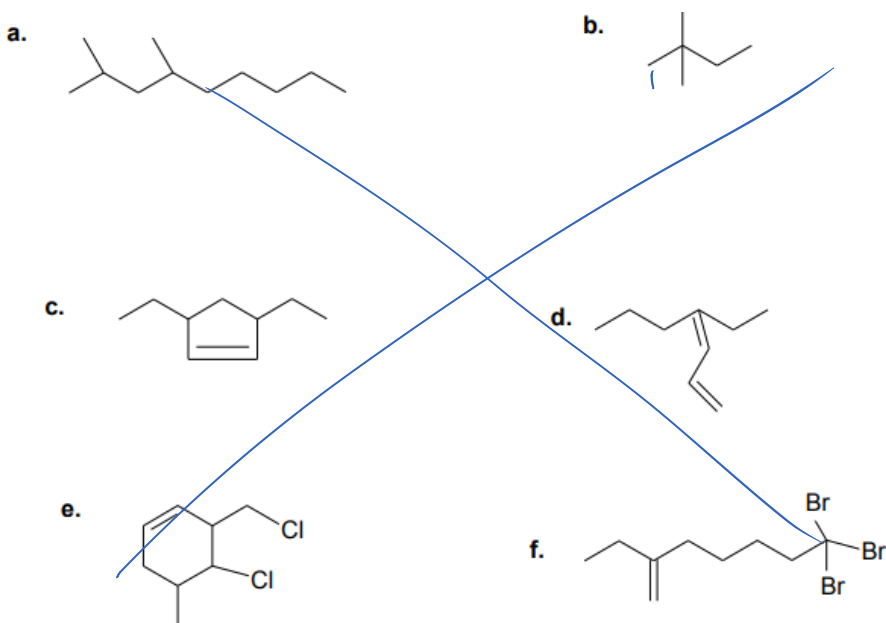


6. Name the following compounds



7. Name the following compounds:





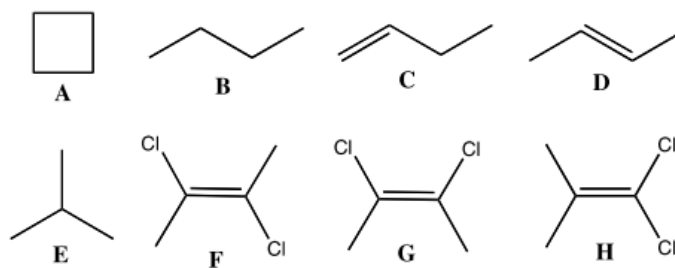
8. Draw condensed structural formulas for the following:

see additional  
handout

- a. Hept-3-ene
- b. 2-methylpentane
- c. Trichloromethane
- d. 2-chloro-3-cyclopentylhexane
- e. Cyclopenta-1,3-diene

- f. 1,4-dibromobenzene
- g. 2-bromo-3-methylbut-2-ene
- h. Nona-1,8-diyne
- i. 3-methylpent-2-ene

9. Use structures A through H to give the best answer(s) for the following statements. If there is no letter that fits the description, write NONE. There may be more than one matching answer for each statement.



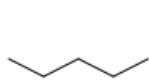
G cis-isomer  
C, D structural isomer of A  
D, F trans-isomer  
C alkene (neither cis or trans)

A cycloalkane  
E structural isomer of B  
H structural isomer of F



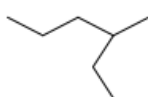
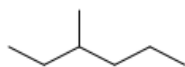
**Question 2.** Identify the pairs in each set as identical or as structural isomers.

a)



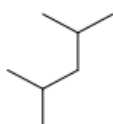
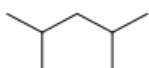
identical

b)



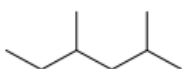
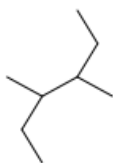
identical

c)



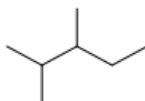
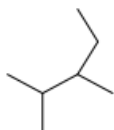
identical

d)



structural  
isomers

e)



identical.