Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chapter 1 Assignment:**

**Classifying Organic Compounds**

 /60

## Problem 1 [ /10]

Draw a condensed structural diagram to represent each compound. Then use the IUPAC system of rules to give a correct name for the compound.

(a) 3-propanal

(b) 4-hexyne

(c) 3-propanol

(d) N-propyl-2,3-dimethylpropanamide

(e) 3-propoxypropane

## Problem 2 [ /5]

One of the sex attractants isolated from a male boll weevil has the structure shown below.



(a) Write the molecular formula of this molecule.

(b) A student classifies this molecule as an aromatic compound. Do you agree or disagree? Give a reason for your

 answer.

(c) Given the shape shown for this molecule, is the molecule polar?

## Problem 3 [ /5]

(a) Into what family of organic compounds is the compound with the molecular formula C4H9Cl grouped? Draw and name all possible structural isomers that have the same molecular formula.

(b) Just as the alcohols are named primary, secondary, and tertiary, this family of organic compounds can be classified in a similar manner. Which isomer from (a) would be classified as tertiary? Give the reason for your answer.

## Problem 4 [ /5]

Give the IUPAC names for the compounds with the following common names.

(a) isopentane

(b) heptyl alcohol

(c) *ortho*-difluorobenzene

(d) amyl alcohol, C5H11OH

(e) butyric acid, C3H7COOH

## Problem 5 [ /4]

Ethyl alcohol has a boiling point of 78.5ºC and ethylamine boils at 16.6ºC. Account for this difference in boiling point.

## Problem 6 [ /10]

Draw a complete structural diagram for each of the following molecules.

(a) 1,3-dimethoxybutane

(b) N-methyl-cyclopentanamine

(c) chloropropanone

(d) 2-propylbutanoate

(e) 3-ethyl-2-pentanol

## Problem 7 [ /4]

(a) Name the carboxylic acid and the alcohol that are used to synthesize the ester.

 O

 **||**

 H3C — C(CH3)2 — CH2 — C — O — CH2 — CH3

(b) Name the carboxylic acid and the amine that are used to synthesize the amide.

 O CH3

 **|| |**

 H3C — C — N — CH2 — CH2 — CH3

## Problem 8 [ /8]

(a) Give the IUPAC name and the common name for the following molecule.

 CH3

  **|**

 H3C — CH2 — CH2 — CH2 — CH — O — CH2 — CH2 — CH3

(b) Is this molecule polar?

(c) In a liquid sample of this substance, will hydrogen bonds exist between molecules? Explain your reasoning.

(d) Can this molecule form hydrogen bonding with isopropyl alcohol? Explain your reasoning.

## Problem 9 [ /12]

Compare the molecules 1-butanamine, N-methyl-1-butanamine, and N,N-dimethyl-1-butanamine with respect to (a) strength of dispersion forces between molecules, (b) polarity of molecule and (c) solubility in water

## Problem 10 [ /7]

Aspartame has been used as an artificial sweetener. Identify the functional groups in the aspartame molecule shown below. Predict, giving reasons, whether or not this substance is soluble in water and in the fatty tissues in our body.

 O

 **║**

 O C―O―CH3

 **║** │

H2N―CH―C―NH―CHCH2―

│

CH2―C―OH

 **║**

####  O

 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chapter 2 Assignment:**

**Reactions of Organic Compounds**

 /65

## Problem 1 [ /8]

A student must distinguish three samples of cyclopentanol, cyclopentene, and cyclopentane. The strategy is to react each sample with HBr(aq). Use structural formulas to indicate the reactions that will occur. Can the three samples be distinguished by this reaction? Give a reason for your answer.

## Problem 2 [ /10]

Name the products formed when the following reagents are combined as described.

(a) 2-chlorobutane reacts with hot concentrated phosphoric acid

(b) 1 mol HBr + 1-heptyne

(c) methyl propanoate is heated in NaOH(aq)

(d) tertiary butyl alcohol + hydrobromic acid

(e) cyclohexanol is heated with concentrated sulfuric acid

## Problem 3 [ /5]

For each reaction in Problem 2, name the type of reaction that has occurred.

## Problem 4 [ /8]

Name the products formed when each of the following compounds undergoes a reduction reaction.

(a) ethyne (2 possibilities)

(b) trans-2-butene

(c) 3,3-dimethyl-2-pentanone

O

**║**

 C―OH

│

(d)

H3C

CH3

## Problem 5 [ /4]

Name the products formed when 2,2-dimethylpropanal is (a) oxidized and (b) reduced?

## Problem 6 [ /8]

Determine the theoretical yield of butanoic acid from the hydrolysis of 5.00 g of methyl butanoate.

## Problem 7 [ /8]

Draw and name the products of the following reactions.

(a) N-ethyl-N-methylethanamide + H2O 

(b) cis-5-methyl-2-hexene + H2O →

(c) NH3 + 1-iodopentane →

(d) HBr + 2,4,4-trimethyl-1-pentene →

## Problem 8 [ /6]

In the reactions that follow, name all molecules and provide a structural formula for any molecules that are missing.

(a) O

  **||**

 CH3CH2CCH2CH2CH3   ?

(b) cyclohexadiene + 2Br2 → ?

(c)  HBr + ?

Br

## Problem 9 [ /4]

When polymerization occurs between the two molecules below, will the product be a condensation polymer or an addition polymer? Explain and include a drawing of the monomer.

HOOC

COOH

 

HOOC

COOH

H2N

NH2

## Problem 10 [ /4]

Draw the structure of the monomer used to prepare each polymer.

 **CN CN**

 **| |**

**(a) ... — CH2CH ═ CHCH2 — ... (b) . .. — C — CH2 — C — CH2 — ...**

 **| |**

 **C — OCH3 C — OCH3**

**|| ||**

 **O O**