Name:_____Class: _____ Date: _____

CHAPTER 22 REVIEW

Organic Chemistry

SECTION 1

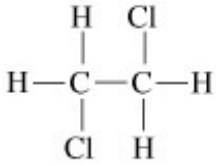
SHORT ANSWER Answer the following questions in the space provided.

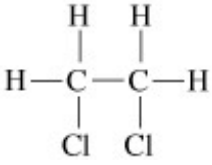
1. Name two types of carbon-containing molecules that are not organic.

_____

2. _____ Carbon atoms form bonds readily with atoms of
   (a) elements other than carbon. (c) both carbon and other elements.
   (b) carbon only. (d) only neutral elements.

3. Explain why the following two molecules are *not* geometric isomers of one another.





_____

_____

_____

4. a. In the space below, draw the structural formulas for two structural isomers with the same molecular formula.

b. In the space below, draw the structural formulas for two geometric isomers with the same molecular formula.

SECTION 1 *continued*

5. Draw a structural formula that demonstrates the catenation of the methane molecule, CH_4.

6. Draw the structural formulas for two structural isomers of C_4H_{10}.

7. Draw the structural formula for the *cis*-isomer of $C_2H_2Cl_2$.

8. Draw the structural formula for the *trans*-isomer of $C_2H_2Cl_2$.

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CHAPTER 22 REVIEW

Organic Chemistry

SECTION 2

SHORT ANSWER Answer the following questions in the space provided.

____1._____Hydrocarbons that contain only single covalent bonds between carbon atoms are called

(a) alkanes.
(b) alkenes.
(c) alkynes.
(d) unsaturated.

____2._____When the longest straight-chain in a hydrocarbon contains seven carbons, its prefix is

(a) pent-.
(b) hex-.
(c) hept-.
(d) oct-.

____3._____The alkyl group with the formula —CH_2—CH_3 is called

(a) methyl.
(b) ethyl.
(c) propyl.
(d) butyl.

4. What is a saturated hydrocarbon?

_____

_____

5. Explain why the general formula for an alkane, C_nH_{2n+2}, correctly predicts hydrocarbons in a homologous series.

_____

_____

_____

_____

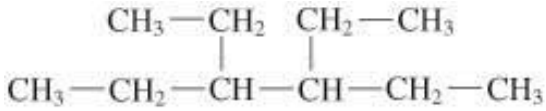
6. Why is the general formula for cycloalkanes, C_nH_{2n}, different from the general formula for straight-chain hydrocarbons?

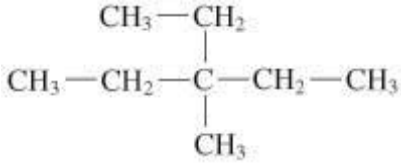
_____

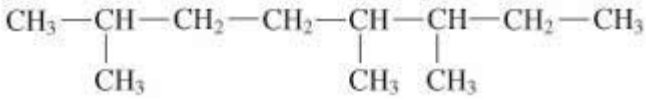
_____

SECTION 2 *continued*

7. Write the IUPAC name for the following structural formulas:

_____ a. 

_____ b. 

_____ c. 

8. Draw the structural formula for each of the following compounds:

a. 3,4-diethyl-2-methy-1-hexene

b. 1-ethyl-2,3-dimethylbenzene

c. 5, 6-dimethyl-2-heptyne

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CHAPTER 22 REVIEW

Organic Chemistry

SECTION 3

SHORT ANSWER Answer the following questions in the space provided.

1. Match the structural formulas on the right to the family name on the left.

_____ aldehyde

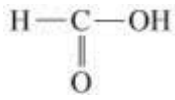
_____ ketone

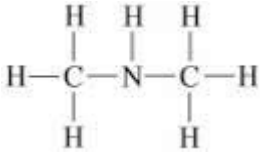
_____ carboxylic acid

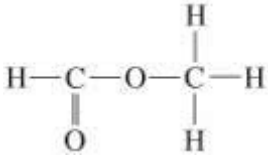
_____ amine

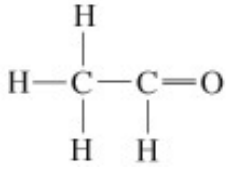
_____ ester

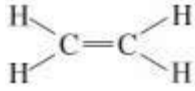
_____ alkene

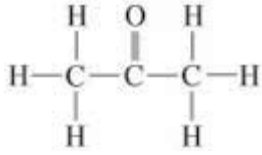
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

2. What is the functional group in glycerol? Explain how glycerol functions in skin care products.

_____

_____

_____

3. List the halogen atoms found in alkyl halides in order of increasing atomic mass.

_____

_____

4. State the difference between aldehydes and ketones.

_____

_____

_____

SECTION 3 *continued*

5. _____ Which is the weaker acid, acetic acid or sulfuric acid?

6. Explain why esters are considered derivatives of carboxylic acids.

_____

_____

7. Draw structural formulas for the following compounds:

a. 1-butanol

b. dichlorodifluoromethane

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CHAPTER 22 REVIEW

Organic Chemistry

SECTION 4

SHORT ANSWER Answer the following questions in the space provided.

1. Match the reaction type on the left to its description on the right.

_____ substitution	(a) An atom or molecule is added to an unsaturated molecule, increasing the saturation of the molecule.
_____ addition	(b) A simple molecule is removed from adjacent atoms of a larger molecule.
_____ condensation	(c) One or more atoms replace another atom or group of atoms in a molecule.
_____ elimination	(d) Two molecules or parts of the same molecule combine.

2. Substitution reactions can require a catalyst to be feasible. The reaction represented by the following equation is heated to maximize the percent yield.

$$C_2H_6(g) + Cl_2(g) + \text{energy} \overset{\Delta}{\underset{\leftarrow}{\rightarrow}} C_2H_5Cl(l) + HCl(g)$$

_____ a. Should a high or low temperature be maintained?

_____ b. Should a high or low pressure be used?

_____ c. Should the HCl gas be allowed to escape into another container?

3. Elemental bromine is a reddish-brown liquid. Hydrocarbon compounds that contain bromine are colorless. A qualitative test for carbon-carbon multiple bonds is the addition of a few drops of bromine solution to a hydrocarbon sample at room temperature and in the absence of sunlight. The bromine will either quickly lose its color or remain reddish brown.

_____ a. If the sample is unsaturated, what type of reaction should occur when the bromine is added under the conditions mentioned above?

_____ b. If the sample is saturated, what type of reaction should occur when the bromine is added under the conditions mentioned above?

_____ c. The reddish brown color of a bromine solution added to a hydrocarbon sample at room temperature and in the absence of sunlight quickly disappears. Is the sample a saturated or unsaturated hydrocarbon?

SECTION 4 *continued*

4. Two molecules of glucose, $C_6H_{12}O_6$, undergo a condensation reaction to form one molecule of sucrose, $C_{12}H_{22}O_{11}$.

   _____ a. How many molecules of water are formed during this condensation reaction?

   b. Write a balanced chemical equation for this condensation reaction.

   _____

5. Addition reactions with halogens tend to proceed rapidly and easily, with the two halogen atoms bonding to the carbon atoms connected by the multiple bond. Thus, only one isomeric product forms.

   a. Write an equation showing the structural formulas for the reaction of Br_2 with 1-butene.

   b. Name the product.

   _____

6. Identify each of the following substances as either a natural or a synthetic polymer.

   _____ a. cellulose

   _____ b. nylon

   _____ c. proteins

7. The text gives several abbreviations commonly used in describing plastics or polymers. For each of the following abbreviations, give the full term and one common household usage.

   a. HDPE

   _____

   b. LDPE

   _____

   c. cPE

   _____

8. Explain why an alkane cannot be used as the monomer of an addition polymer.

   _____

   _____

   _____