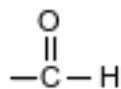


## Functional Groups And Types Of Organic Compounds

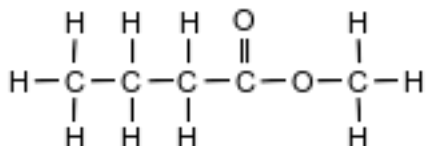
1 Given the organic functional group:



Which class of organic compounds has molecules with this functional group?

- (1) aldehydes                      (3) ketones  
(2) esters                            (4) organic acids

2 Given the formula for a compound:



What is the name of this compound?

- (1) methyl butanoate            (3) pentanone  
(2) methyl butyl ether        (4) pentanoic acid

3 Which functional group contains a nitrogen atom and an oxygen atom?

- (1) ester                              (3) amide  
(2) ether                              (4) amine

4 An alcohol and an ether have the same molecular formula,  $\text{C}_2\text{H}_6\text{O}$ . These two compounds have

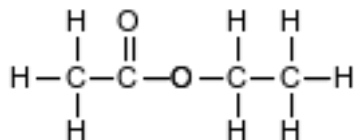
- (1) the same functional group and the same physical and chemical properties  
(2) the same functional group and different physical and chemical properties  
(3) different functional groups and the same physical and chemical properties  
(4) different functional groups and different physical and chemical properties

5 Amines, amides, and amino acids are categories of

- (1) isomers                            (3) organic compounds  
(2) isotopes                            (4) inorganic compounds

Base your answers to questions 6 on the information below and on your knowledge of chemistry.

Ethyl ethanoate is used as a solvent for varnishes and in the manufacture of artificial leather. The formula below represents a molecule of ethyl ethanoate.

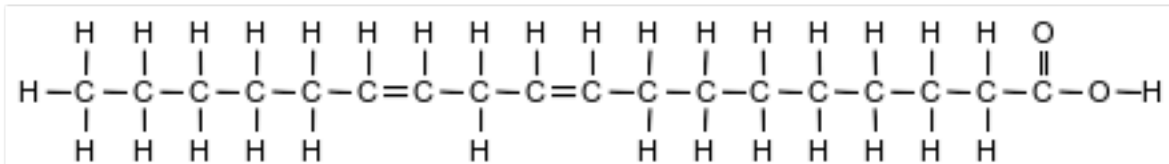


6 Write the name of the class of organic compounds to which this compound belongs.

7 Draw a structural formula for methanal.

Base your answers to questions 8 on the information below and on your knowledge of chemistry.

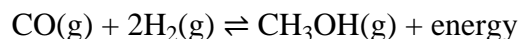
Fatty acids, a class of compounds found in living things, are organic acids with long hydrocarbon chains. Linoleic acid, an unsaturated fatty acid, is essential for human skin flexibility and smoothness. The formula below represents a molecule of linoleic acid.



8 On the diagram in your answer booklet, circle the organic acid functional group.

Base your answers to questions 9 on the information below and your knowledge of chemistry.

Methanol can be manufactured by a reaction that is reversible. In the reaction, carbon monoxide gas and hydrogen gas react using a catalyst. The equation below represents this system at equilibrium.

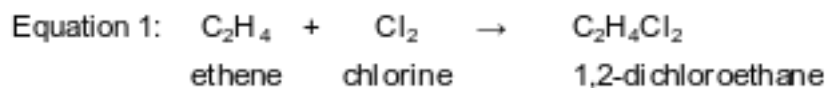


9 State the class of organic compounds to which the product of the forward reaction belongs.

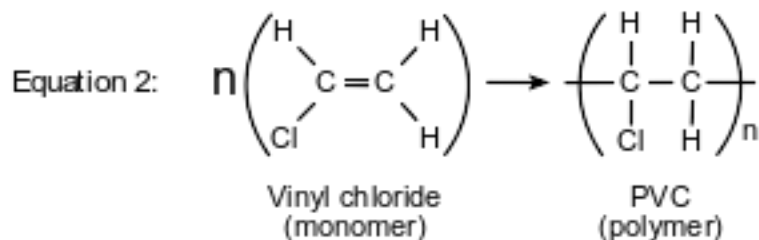
10 Draw a structural formula for 2-butanol.

Base your answers to questions 11 on the information below and on your knowledge of chemistry.

Polyvinyl chloride (PVC) is a polymer used to make drain pipes, flooring, electric wire insulation, and some plastic bottles. Making PVC requires several reactions. The first step is represented by the equation below.



The 1,2-dichloroethane is converted to vinyl chloride. To produce PVC, the vinyl chloride monomer is polymerized, as represented by the equation below.

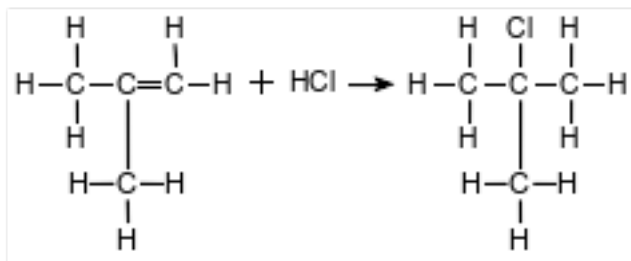


Note:  $n$  and  $n$  represent the same large number in the equation.

11 Draw a structural formula for the product of equation 1.

Base your answers to questions 12 on the information below and on your knowledge of chemistry.

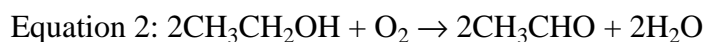
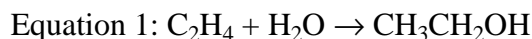
The equation below represents the reaction between 2-methylpropene and hydrogen chloride gas.



12 Identify the class of organic compounds to which the product belongs.

Base your answers to questions 13 on the information below and on your knowledge of chemistry.

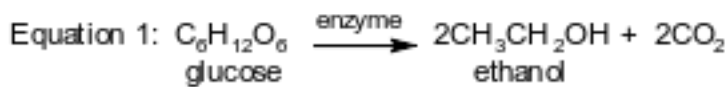
Molecules containing two carbon atoms and a functional group have many home and industrial uses. These compounds can be produced by a variety of reactions, as shown by the equations below.



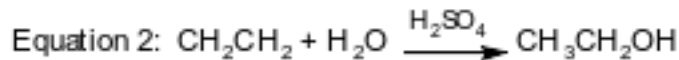
13 Identify the class of organic compounds to which the product in equation 3 belongs.

Base your answers to questions 14 on the information below and on your knowledge of chemistry.

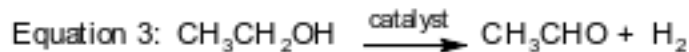
In industry, ethanol is primarily produced by two different reactions. One process involves the reaction of glucose in the presence of an enzyme that acts as a catalyst. The equation below represents this reaction.



In another reaction, ethanol is produced from ethene and water. The equation below represents this reaction in which  $\text{H}_2\text{SO}_4$  is a catalyst.



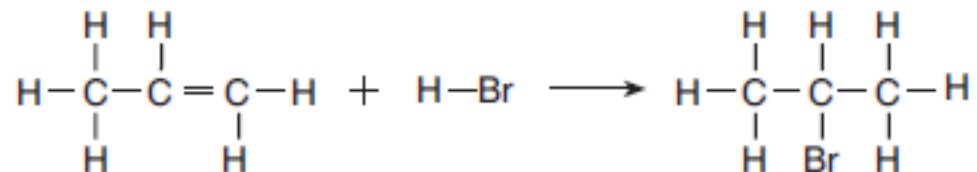
Industrial ethanol can be oxidized using a catalyst to produce ethanal. The equation representing this oxidation is shown below.



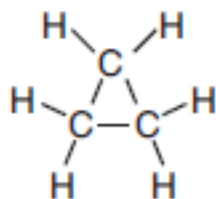
14 Draw a structural formula for the organic product in equation 3.

Base your answers to questions 15 on the information below and on your knowledge of chemistry.

The equation below represents a reaction between propene and hydrogen bromide.



Cyclopropane, an isomer of propene, has a boiling point of  $-33^{\circ}\text{C}$  at standard pressure and is represented by the formula below.



15 Identify the class of organic compounds to which the product of this reaction belongs.

## Answer Keys

1 1

2 1

3 3

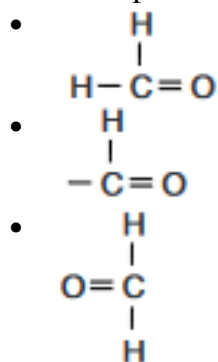
4 4

5 3

6 Allow 1 credit for ester or esters.

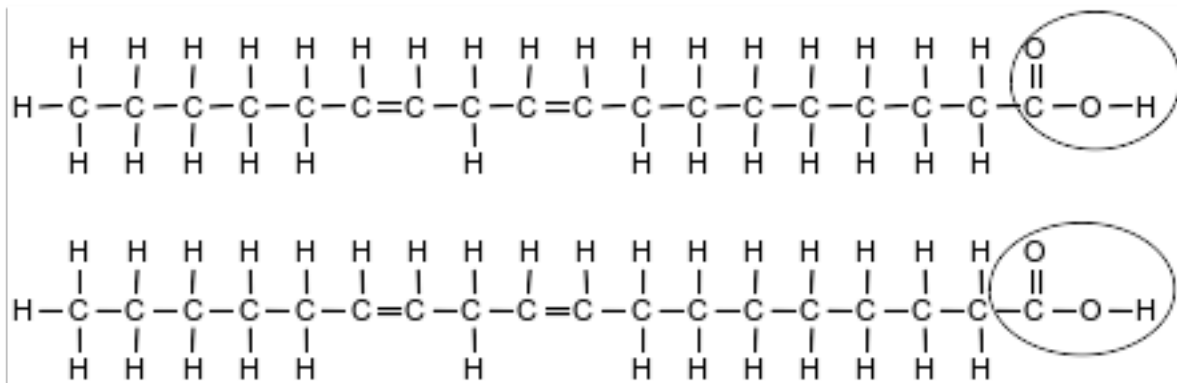
7 Allow 1 credit.

- Examples of 1-credit responses:



8 Allow 1 credit.

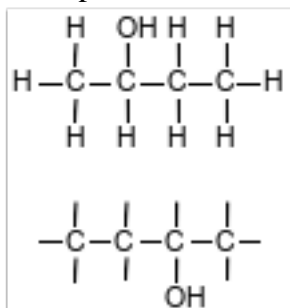
- Examples of 1-credit responses:



9 Allow 1 credit for alcohol or alcohols.

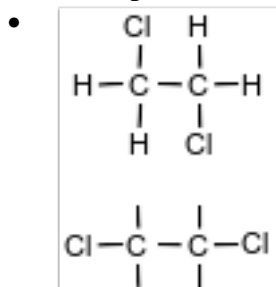
10 Allow 1 credit.

- Examples of 1-credit responses



11 Allow 1 credit.

- Examples of 1-credit responses:



12 Allow 1 credit. Acceptable responses include, but are not limited to:

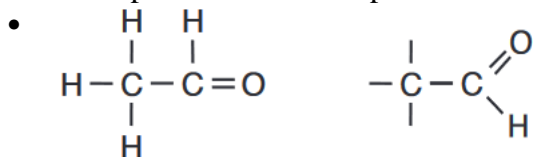
- halide
- halocarbons
- alkyl halide

13 Allow 1 credit. Acceptable responses include, but are not limited to:

- organic acid
- carboxylic acid
- acids

14 Allow 1 credit.

- Examples of 1-credit responses:



15 Allow 1 credit. Acceptable responses include, but are not limited to:

- halide
- halocarbon
- alkyl halide