Chapter 24 Organic Chemistry

Student: _____

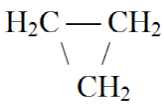
1. The general formula for *alkenes* is

   A. C_nH_{2n+2}
   B. $C_{2n}H_{2n}$
   C. C_nH_{n+2}
   D. C_nH_{2n}
   E. C_nH_{2n-2}

2. The general formula of an *alkane* is

   A. C_nH_{2n}
   B. C_nH_{2n+2}
   C. C_nH_{2n-2}
   D. C_nH_{2n+4}
   E. C_nH_{2n-4}

3. Which one of these formulas is that of an *unsaturated* hydrocarbon?

   A. $CH_3–CH_2–CH_3$
   B. $CH_3–CH=CH_2$
   C. $CH_3–CH_2–OH$
   D. $CH_3–O–CH_2–CH_3$
   E. 

4. Which of these molecules is *unsaturated*?

   A. C_3H_8
   B. CH_3OH
   C. C_5H_{10}
   D. CH_4
   E. C_4H_{10}

5. The formula $CH_3CH_2CH_2CH_2CH_2CH{=}CH_2$ represents

A. an alkane.
B. an alkyne.
C. an alcohol.
D. an unsaturated hydrocarbon.
E. a CFC.

6. Which one of these hydrocarbons does *not* have isomers?

A. C_7H_{16}
B. C_6H_{14}
C. C_5H_{10}
D. C_4H_8
E. C_3H_8

7. How many structural isomers are there of C_4H_{10}?

A. 4
B. 6
C. 2
D. 8
E. 10

8. Which of these species are *structural isomers* of C_6H_{14}?

I. $CH_3{-}CH_2{-}\underset{\displaystyle CH_2CH_3}{\underset{|}{CH}}{-}CH_2CH_3$

II. $CH_3{-}\underset{\displaystyle CH_2{-}CH_3}{\underset{|}{CH}}{-}CH_2{-}CH_3$

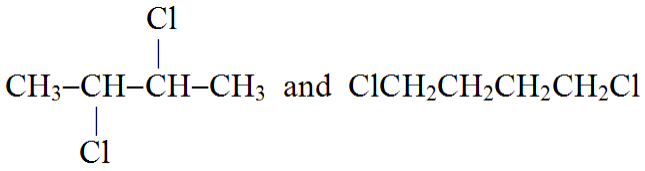
III. $\begin{array}{l} \quad\quad CH_3 \\ \quad\quad\ | \\ CH_3{-}C{-}CH{-}CH_3 \\ \quad\quad\ |\ \ | \\ \quad H_3C\ \ CH_3 \end{array}$

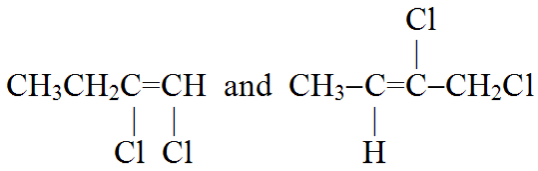
IV. $\begin{array}{l} CH_3{-}CH_2 \quad\quad\quad CH_3 \\ \quad\quad\ | \quad\quad\quad\ | \\ \quad CH_2{-}CH_2{-}CH_2 \end{array}$

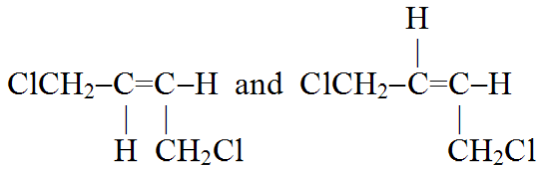
A. I and II
B. I and III
C. II and III
D. II and IV
E. III and IV

9. Which of these pairs are *geometric isomers*?

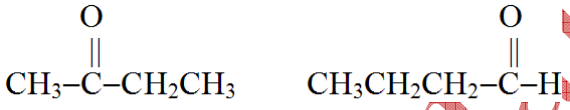
A. $CH_3CH_2-O-CH_2CH_3$ and $CH_3CH_2CH_2CH_2OH$

B.  and $ClCH_2CH_2CH_2CH_2Cl$

C. 

D. 

10. The two molecules represented below are examples of



A. isomers
B. isotopes
C. alcohols
D. carboxylic acids
E. unsaturated hydrocarbons

11. The two molecules represented below are examples of

A. geometric isomers.
B. structural isomers.
C. optical isomers.
D. stereoisomers.
E. none of these

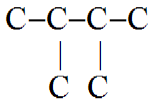
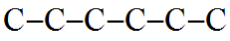
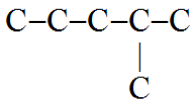
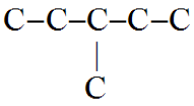
12. Which of these species is an aromatic compound?

A. C_2H_2
B. C_6H_{12}
C. $C_6H_4Br_2$
D. C_5H_{10}
E. $C_2H_4Br_2$

13. The octane rating of gasoline refers to its

A. percentage C_8H_{18} by volume.
B. radiation dose.
C. alcohol level.
D. ability to resist engine knocking.
E. percentage of unsaturated hydrocarbons.

14. Which one of these hydrocarbon chains would have the highest octane rating?

A. 
B. 
C. 
D. 

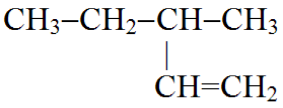
15. The compound that has a triple bond between one pair of carbon atoms is called a/an

A. alkane.
B. chlorofluorocarbon.
C. alkyne.
D. alkene.
E. alcohol.

16. The alkane with six carbon atoms is called

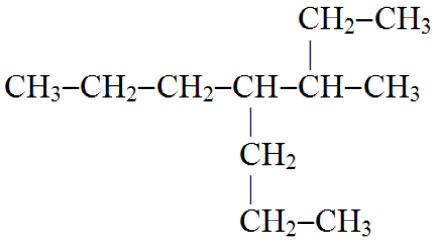
A. butane.
B. hexane.
C. heptane.
D. butene.
E. none of these.

17. Which of these is the systematic name for the compound represented below?



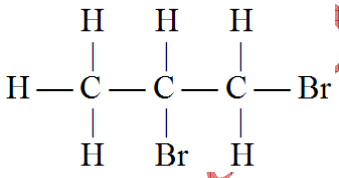
A. 2-ethylbutane
B. 3-methylpentene
C. 3-methyl-1-pentene
D. 3-methyl-1-hexene
E. 2-methylhexane

18. The systematic name for the compound represented below is



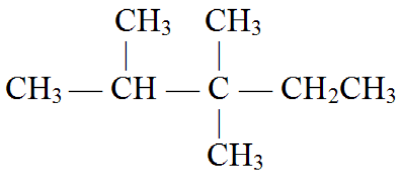
A. 4,5-diethylheptane.
B. 3-propyl-4-ethylhexane.
C. 3-ethyl-4-propylhexane.
D. 3-methyl-4-propylheptane.
E. 2-ethyl-4-propylhexane.

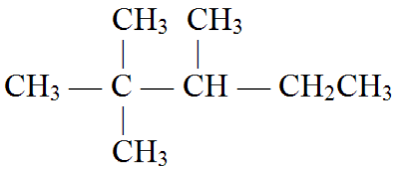
19. Which of these is the systematic name for the compound represented below?

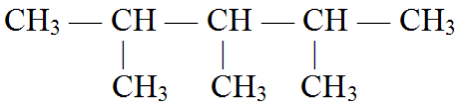


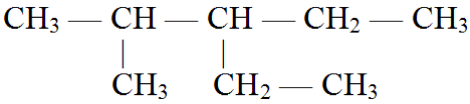
A. 2,3-dibromopentane
B. 1,2-dibromopentane
C. 2,3-dibromopropane
D. 1,2-propane dibromide
E. 1,2-dibromopropane

20. The correct structure for 2,3,3-trimethylpentane is

A. 

B. 

C. 

D. 

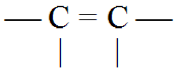
21. The group of atoms that is responsible for the characteristic properties of a family of organic compounds is called a/an _____ group.

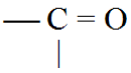
A. hydrocarbon
B. functional
C. ether
D. enzyme
E. polyatomic ion

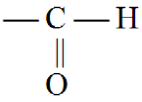
22. Organic compounds with the general formula R-O-R (where R is an alkyl group) are called

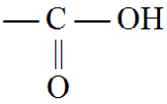
A. alkenes.
B. alcohols.
C. ethers.
D. aldehydes.
E. organic acids.

23. Which one of these structures represents a *carboxyl* functional group

A. 

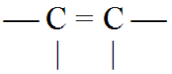
B. 

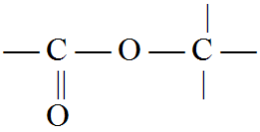
C. 

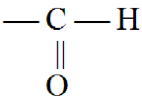
D. 

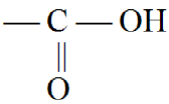
E. 

24. Which one of these structures represents an *ester* functional group?

A. 

B. 

C. 

D. 

25. Which one of these choices is the formula for a *ketone*?

A. CH_3CHO
B. CH_3OCH_3
C. CH_3COCH_3
D. CH_3COOH
E. $HC{\equiv}CH$

26. "Wood alcohol" is the common name for

A. methanol.
B. ethanol.
C. propyl alcohol.
D. ethylene.
E. acetylene.

27. The name for the compound with the formula $CH_3CH_2CH_2CH_2OH$ is

A. propanol.
B. propane.
C. butanol.
D. pentane.
E. pentanol.

28. Which type of organic compound does *not* contain a carbonyl group?

A. ethers
B. carboxylic acids
C. ketones
D. aldehydes
E. esters

29. Acetylene, C_2H_2, the simplest alkyne, can be prepared from "inorganic" materials. Which of these reactions is used to prepare acetylene in this way?

A. $2C + H_2 \rightarrow C_2H_2$
B. $C_2H_4 \rightarrow C_2H_2 + H_2$
C. $2CO + 2H_2O \rightarrow C_2H_2 + H_2O_2$
D. $CaC_2 + 2H_2O \rightarrow C_2H_2 + Ca(OH)_2$

30. Which one of these compounds will result from the addition of HCl to $CH_3{-}CH{=}CH_2$?

A. $CH_3Cl + CH_2{=}CH_2$
B. $CH_3{-}CHCl{=}CH_2$
C. $CH_3{-}CHCl{-}CH_3$
D. $CH_3{-}CH_2{-}CH_2Cl$
E. none of these

31. Which is the product of the reaction of one mole of HCl with one mole of 1-butyne?

A. 1-chloro-1-butene
B. 1-chloro-2-butene
C. 2-chloro-1-butene
D. ethyl chloride + acetylene

32. The reaction of an alcohol and a carboxylic acid yields

A. a hydrocarbon.
B. an ester.
C. an ether.
D. an aldehyde.
E. a ketone.

33. The reaction of ethylene and water yields

A. an aldehyde.
B. an ester.
C. an alcohol.
D. an ether.
E. an organic acid.

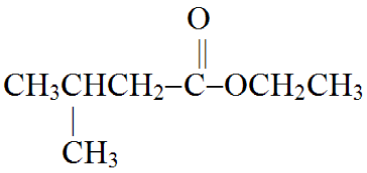
34. Oxidation of the 2-propanol will produce a/an

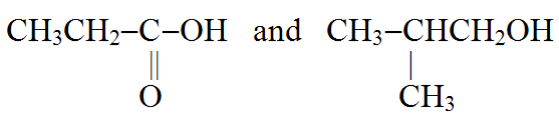
A. aldehyde.
B. amine.
C. alkene.
D. ketone.
E. carboxylic acid.

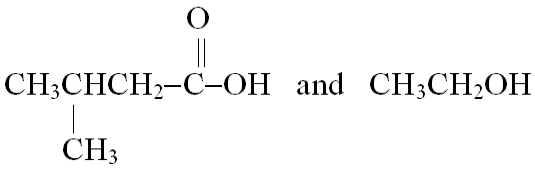
35. Esters are synthesized from two classes of organic compounds. Those two types of compounds are

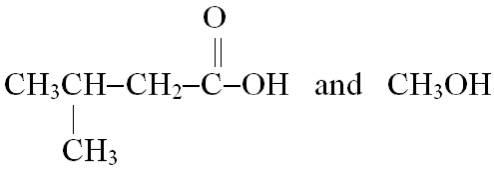
A. acids and bases.
B. amines and alcohols.
C. alcohols and acids.
D. amines and alkenes.
E. alkenes and bases.

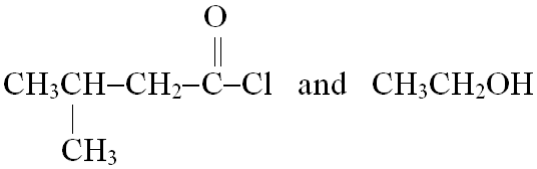
36. Which choice gives the structures of the reaction products when the ester below is hydrolyzed in acid solution?



A. 

B. 

C. 

D. 

37. The reaction of Cl_2 with CH_4 to produce methyl chloride is an example of a/an

A. free radical reaction.
B. addition reaction.
C. reduction reaction.
D. ester hydrolysis.
E. polymerization.

38. Which of these statements describes a *condensation* reaction?

A. addition of H_2O to a double bond
B. linking an acid and an alcohol to make an ester and water
C. addition of H_2 to an alkene
D. oxidation of ethanol to acetaldehyde
E. hydrolysis of an ester

39. Bromination of benzene (C_6H_6), an aromatic compound,

A. occurs by substitution rather than addition.
B. occurs by addition rather than substitution.
C. occurs more rapidly than bromination of a nonaromatic compound.
D. results in formation of 1,2,3,4,5,6-hexabromocyclohexane.
E. occurs in the absence of a catalyst.

40. *Amines* are

A. organic bases that react with water to produce ammonia.
B. organic acids that react with water to produce ammonia.
C. organic bases that react with acids to form ammonium salts.
D. organic acids that react with bases to form ammonium salts.
E. none of these.

41. Which of these reactions leads to a change in the hybridization of one or more carbon atoms?

A. free radical halogenation of an alkane
B. hydrolysis of an ester to yield an acid and an alcohol
C. substitution of an aromatic ring using a halogen
D. oxidation of an alcohol to yield a carboxylic acid
E. neutralization of an amine using a strong mineral acid

42. Which functional group, when present in a compound that is allowed to stand in air, poses a danger of slowly yielding explosive peroxides?

A. ether
B. alcohol
C. carboxylic acid
D. ketone
E. unsaturated hydrocarbon

43. Which of the following compounds are isomers?

I. pentane

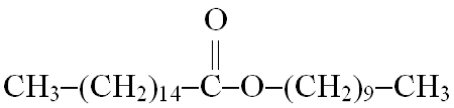
II. 2-methylbutane

III. 2,3-dimethylbutane

IV. 2,2-dimethylpropane

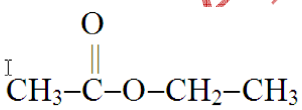
V. 1-hexene

44. Write the formula for the alcohol and the carboxylic acid from which the following ester may be synthesized.



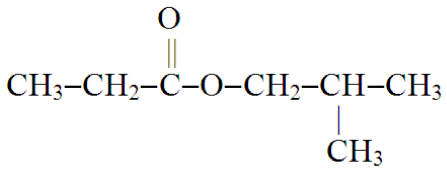
myricyl palmitate (beeswax)

45. Write the formula for the alcohol and the carboxylic acid from which the following ester may be synthesized.



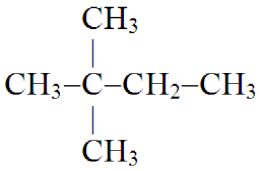
ethyl acetate (nail polish remover)

46. Write the formula for the alcohol and the carboxylic acid from which the following ester may be synthesized.

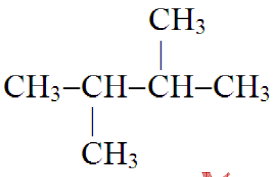


isobutyl propionate (rum flavor)

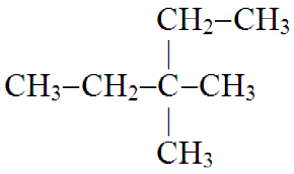
47. Name the following compound:



48. Name the following compound:

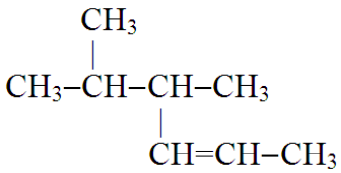


49. The systematic name for the hydrocarbon with the following structural formula is 1-ethyl-2-methylbutane.



True False

50. The systematic name for the compound with the following structural formula is 4,5-dimethyl-2-hexene.



True False

51. The oxidation product of 1-propanol when using $Cr_2O_7^{2-}$ as the oxidizing agent is acetone.

True False

52. The reaction of hydrogen chloride gas with propene will yield 1-chloropropane as the main product.

True False

53. Cycloalkanes have the general formula C_nH_{2n}.

True False

Chapter 24 Organic Chemistry Key

1.D
2.B
3.B
4.C
5.D
6.E
7.C
8.D
9.D
10.A
11.B
12.C
13.D
14.A
15.C
16.B
17.C
18.D
19.E
20.A
21.B
22.C
23.D
24.B
25.C
26.A
27.C

28.A

29.D

30.C

31.C

32.B

33.C

34.D

35.C

36.B

37.A

38.B

39.A

40.C

41.D

42.A

43.I, II, and IV

44. $CH_3-(CH_2)_{14}-COOH$ and $CH_3-(CH_2)_9-OH$

45. CH_3-COOH and CH_3-CH_2-OH

CH_3-CH_2-COOH and $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-OH$

46.

47. 2,2-dimethylbutane

48. 2,3-dimethylbutane

49.FALSE

50.TRUE

51.FALSE

52.FALSE

53.TRUE