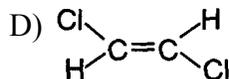
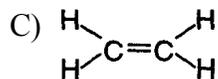
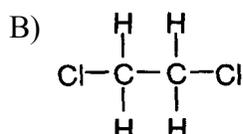
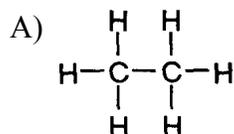


1. Which structural formula represents a saturated hydrocarbon?



2. Which molecule contains ten hydrogen atoms?

A) butane

B) butene

C) propane

D) propene

3. A double carbon-carbon bond is found in a molecule of

A) pentane

B) pentene

C) pentyne

D) pentanol

4. Which formula represents an unsaturated hydrocarbon?

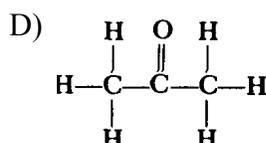
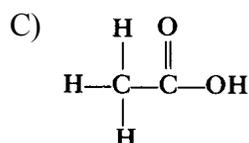
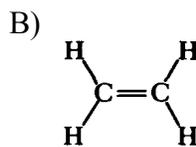
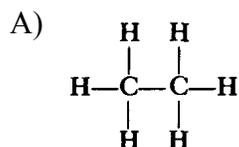
A) CH_2CHCl

B) $\text{CH}_3\text{CH}_2\text{Cl}$

C) $\text{CH}_3\text{CH}_2\text{CH}_3$

D) CH_3CHCH_2

5. Which formula represents an unsaturated hydrocarbon?



6. The multiple covalent bond in a molecule of 1-butene is a

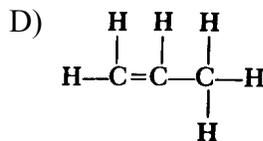
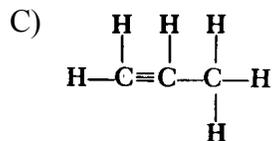
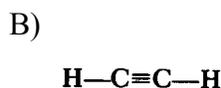
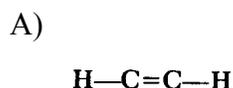
A) double covalent bond that has 6 shared electrons

B) double covalent bond that has 4 shared electrons

C) triple covalent bond that has 6 shared electrons

D) triple covalent bond that has 4 shared electrons

7. Which is the correct structural formula of propene?



8. What is the general formula for the members of the alkane series?

A) C_nH_{2n}

B) $\text{C}_n\text{H}_{2n+2}$

C) $\text{C}_n\text{H}_{2n-2}$

D) $\text{C}_n\text{H}_{2n-6}$

9. Hydrocarbons are compounds that contain

A) carbon, only

B) carbon and hydrogen, only

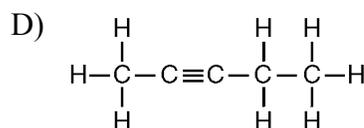
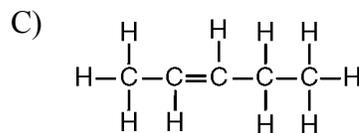
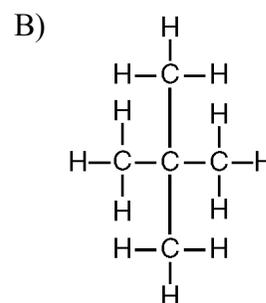
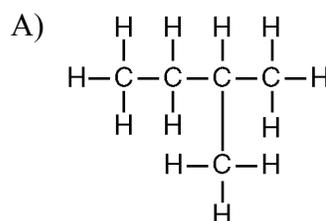
C) carbon, hydrogen, and oxygen, only

D) carbon, hydrogen, oxygen, and nitrogen, only

10. Which formula represents a molecule of a saturated hydrocarbon?

A) C_2H_2 B) C_4H_{10} C) C_5H_8 D) C_6H_6

11. Which structural formula represents 2-pentyne?



12. Which formula represents propyne?

A) C_3H_4

B) C_3H_6

C) C_5H_8

D) C_5H_{10}

13. Which general formula represents the homologous series of hydrocarbons that includes the compound 1-heptyne?

A) $\text{C}_n\text{H}_{2n-6}$

B) $\text{C}_n\text{H}_{2n-2}$

C) C_nH_{2n}

D) $\text{C}_n\text{H}_{2n+2}$

14. Which is a characteristic of most organic compounds?

A) They have very strong intermolecular forces.

B) They are primarily ionic in character.

C) They generally have low melting and boiling points.

D) They are all highly soluble in water.

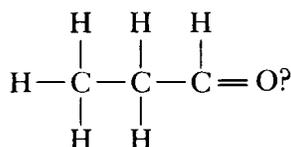
15. Ethanol and dimethyl ether have different chemical and physical properties because they have different

- A) functional groups
- B) molecular masses
- C) numbers of covalent bonds
- D) percent compositions by mass

16. In a given homologous series of hydrocarbons, the boiling point generally increases as the size of the molecules increases. The best explanation for this statement is that in larger organic molecules

- A) the number of covalent bonds per molecule is greater
- B) the molecules are more symmetrical
- C) more hydrogen bonding is possible
- D) there are greater intermolecular forces

17. Which structural formula represents an isomer of

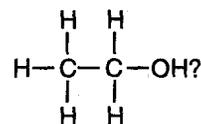


- A) $\begin{array}{c} \text{H} & \text{H} & & \text{H} \\ | & | & | & | \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{C}-\text{H} \\ | & | & & | \\ \text{H} & \text{H} & & \text{H} \end{array}$
- B) $\begin{array}{c} \text{H} & \text{O} & \text{H} \\ | & || & | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ | & & | \\ \text{H} & & \text{H} \end{array}$
- C) $\begin{array}{c} \text{H} & \text{H} & \text{H} \\ | & | & | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ | & | & | \\ \text{H} & \text{H} & \text{H} \end{array}$
- D) $\begin{array}{c} \text{H} & \text{H} & \text{O} \\ | & | & || \\ \text{H}-\text{C}-\text{C}-\text{C} \\ | & | & \backslash \\ \text{H} & \text{H} & \text{OH} \end{array}$

18. Which two compounds are isomers of each other?

- A) CH_3OCH_3 and $\text{CH}_3\text{CH}_2\text{OH}$
- B) $\text{CH}_3\text{CH}_2\text{Cl}$ and $\text{C}_6\text{H}_5\text{Cl}$
- C) CH_3COCH_3 and CH_3OCH_3
- D) $\text{CH}_3(\text{CH})_2\text{CH}_3$ and $\text{CH}_3(\text{CH})_2\text{CH}_3$

19. Which is an isomer of



- A) $\begin{array}{c} \text{H} & & \text{H} \\ | & & | \\ \text{H}-\text{C}-\text{O}-\text{C}-\text{H} \\ | & & | \\ \text{H} & & \text{H} \end{array}$
- B) $\begin{array}{c} \text{H} & \text{H} \\ | & | \\ \text{HO}-\text{C}-\text{C}-\text{H} \\ | & | \\ \text{H} & \text{H} \end{array}$
- C) $\begin{array}{c} \text{H} & \text{O} \\ | & || \\ \text{H}-\text{C}-\text{C}-\text{H} \\ | & \\ \text{H} & \end{array}$
- D) $\begin{array}{c} \text{H} & \text{H} & \text{H} \\ | & | & | \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{C}-\text{H} \\ | & | & | \\ \text{H} & \text{H} & \text{H} \end{array}$

20. The formula of methanoic acid is

- A) HCHO
- B) HCOOH
- C) CH_3OH
- D) HCOOCH_3

21. In an aqueous solution, which compound will be most acidic?

- A) CH_3COOH
- B) $\text{CH}_3\text{CH}_2\text{OH}$
- C) $\text{C}_3\text{H}_5(\text{OH})_3$
- D) CH_3OH

22. The formula $\text{C}_5\text{H}_{11}\text{OH}$ represents an

- A) acid
- B) ester
- C) ether
- D) alcohol

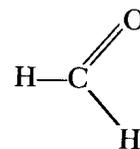
23. Which two compounds are monohydroxy alcohols?

- A) ethylene glycol and ethanol
- B) ethylene glycol and glycerol
- C) methanol and ethanol
- D) methanol and glycerol

24. The compound HCHO is an example of an

- A) ether
- B) aldehyde
- C) alcohol
- D) acid

25.



Which is represented by the structural formula above?

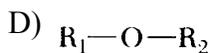
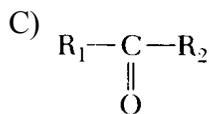
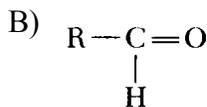
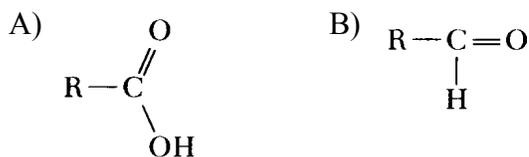
- A) an aldehyde
- B) an alcohol
- C) an alkane
- D) an acid

26. Which formula represents a ketone?

- A) HCOOH
- B) HCHO
- C) CH_3COCH_3
- D) $\text{CH}_3\text{CH}_2\text{OH}$

Reagents review Organic chemistry

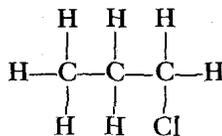
27. Which general formula represents a ketone?



28. Which class of compounds contains *at least one* element from Group 17 of the Periodic Table?

- A) aldehyde B) amine
C) ester D) halide

29. What is the correct IUPAC name of the following compound?



- A) ethane B) propane
C) 3-chloropropane D) 1-chloropropane

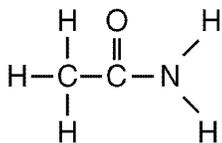
30. Which formula correctly represents an ester?

- A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ B) CH_3COCH_3
C) $\text{CH}_3\text{COOCH}_3$ D) $\text{CH}_3\text{CH}_2\text{COOH}$

31. The reaction between an organic acid and an alcohol produces

- A) an aldehyde B) a ketone
C) an ether D) an ester

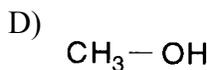
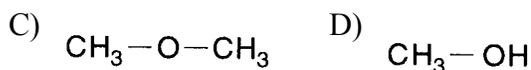
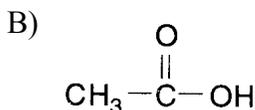
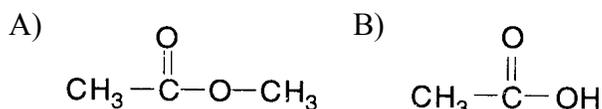
32. Given the structural formula:



This compound is classified as an

- A) amide B) amine
C) aldehyde D) alcohol

33. Which formula represents an ether?



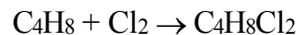
34. Which class of compounds has the general formula $\text{R}_1-\text{O}-\text{R}_2$?

- A) esters B) alcohols
C) ethers D) aldehydes

35. The product of a reaction between a hydrocarbon and chlorine was 1,2-dichloropropane. The hydrocarbon must have been

- A) C_5H_{10} B) C_2H_4 C) C_3H_6 D) C_4H_8

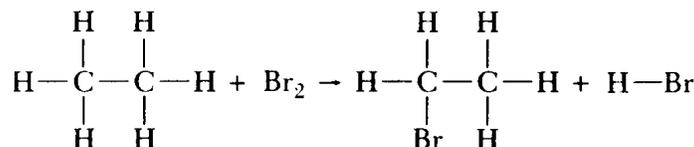
36. Given the reaction:



This reaction is an example of

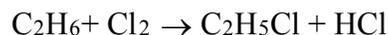
- A) substitution B) addition
C) polymerization D) fermentation

37. Which organic product is formed by the reaction below?



- A) bromoethane B) bromoethene
C) bromoethyne D) bromobenzene

38. Given the equation:



This reaction is best described as

- A) addition involving a saturated hydrocarbon
B) addition involving an unsaturated hydrocarbon
C) substitution involving a saturated hydrocarbon
D) substitution involving an unsaturated hydrocarbon

39. Which polymers occur naturally?

- A) starch and nylon B) starch and cellulose
C) protein and nylon D) protein and plastic

40. Cellulose, protein, and starch are classified as

- A) aldehydes B) esters
C) synthetic polymers D) natural polymers

Reagents review Organic chemistry

41. In the reaction:



the organic product can best be identified as

- A) an alcohol B) a ketone
C) an ester D) an acid

42. A mixture of ethanoic (acetic) acid and ethanol (ethyl alcohol) is heated in the presence of concentrated sulfuric acid. The organic product formed is

- A) $\text{CH}_3\text{COOC}_2\text{H}_5$ B) $\text{CH}_3\text{COC}_2\text{H}_5\text{OH}$
C) $\text{CH}_3\text{COC}_2\text{H}_5$ D) $\text{C}_2\text{H}_5\text{CH}_3\text{COOH}$

43. What are the products of a fermentation reaction?

- A) an alcohol and carbon monoxide
B) an alcohol and carbon dioxide
C) a salt and water
D) a salt and an acid

44. The fermentation of $\text{C}_6\text{H}_{12}\text{O}_6$ will produce CO_2 and

- A) $\text{C}_3\text{H}_5(\text{OH})_3$ B) $\text{C}_2\text{H}_5\text{OH}$
C) $\text{Ca}(\text{OH})_2$ D) $\text{Cr}(\text{OH})_3$

45. In the presence of excess oxygen, hydrocarbons burn completely to form water and

- A) CO B) CO_2 C) C D) CO_3^{2-}

46. Which products are obtained when $\text{CH}_4(\text{g})$ burns completely in an excess of oxygen?

- A) CO and H_2O B) CO and C
C) CO_2 and H_2O D) CO_2 and CO

47. The principal products of saponification, a reaction between a fat and a base, are soap and

- A) water B) glycerol
C) carbon dioxide D) ethyl alcohol

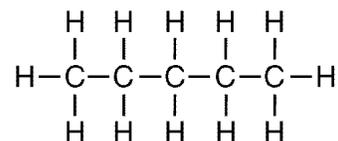
48. Which reaction results in the production of soap?

- A) esterification B) fermentation
C) polymerization D) saponification

49. Primary alcohols can be dehydrated to produce

- A) ethers B) organic acids
C) esters D) aldehydes

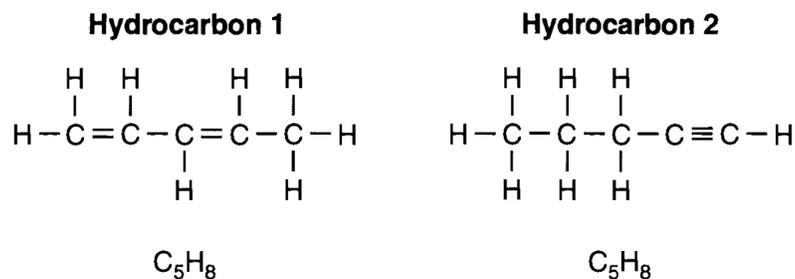
50. Given the structural formula of pentane:



Draw a structural formula for an isomer of pentane.

51. Base your answer to the following question on the information below.

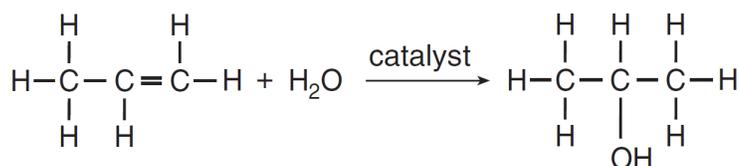
Two hydrocarbons that are isomers of each other are represented by the structural formulas and molecular formulas below.



Explain, in terms of structural formulas and molecular formulas, why these hydrocarbons are isomers of each other.

Base your answers to questions **52** through **54** on the information below.

In one industrial organic reaction, C_3H_6 reacts with water in the presence of a catalyst. This reaction is represented by the balanced equation below.



52. Identify the class of compound to which the product of the reaction belongs.

53. Write the IUPAC name for the organic reactant.

54. Explain, in terms of bonding, why C_3H_6 is classified as an unsaturated hydrocarbon.

55. Base your answer to the following question on the information below.

Gasoline is a mixture composed primarily of hydrocarbons such as isooctane, which is also known as 2,2,4-trimethylpentane.

Gasoline is assigned a number called an octane rating. Gasoline with an octane rating of 87 performs the same as a mixture that consists of 87% isooctane and 13% heptane.

An alternative fuel, E-85, can be used in some automobiles. This fuel is a mixture of 85% ethanol and 15% gasoline.

In the space below, draw a structural formula for a molecule of 2,2,4-trimethylpentane.