

**Project Advance Chemistry 116 Sample Questions
on Material in *General Chemistry*, Brown, LeMay, and Bursten**

**Chapter 26. Organic Chemistry
Spring Semester 1995**

- Which of the following could be a cycloalkane?
 - C_6H_{14}
 - C_4H_{10}
 - C_5H_{12}
 - C_6H_{12}
 - C_3H_8
- Which of the following could be an alkyne?
 - C_4H_8
 - C_2H_4
 - C_3H_6
 - C_4H_6
 - C_2H_6
- All of the following are structural isomers of C_6H_{14} except
 - $CH_3(CH_2)_2CH(CH_3)_2$
 - $CH_3(CH_2)_4CH_3$
 - $(CH_3)_2CHCH_2CH_3$
 - $CH_3CH_2C(CH_3)_3$
 - $(CH_3)_2CHCH(CH_3)_2$
- How many structural isomers are possible for hexane?
 - 3
 - 4
 - 5
 - 2
 - 1
- How many structural isomers are possible for heptane?
 - 3
 - 7
 - 5
 - 4
 - 9
- The compound $(CH_3)_2CHCH(CH_3)CH_2CH(CH_2CH_3)CH_2CH_2CH_3$ is named as a derivative of
 - octane
 - heptane
 - hexane
 - nonane
 - decane

7. The compound $(\text{CH}_3)_3\text{CCH}_2\text{CH}(\text{CH}_3)_2$ is named as a derivative of
- (a) octane
 - (b) pentane
 - (c) butane
 - (d) hexane
 - (e) heptane
8. The compound $(\text{CH}_3)_3\text{CCH}_2\text{CH}(\text{CH}_3)_2$ is
- (a) named as a pentane but is an isomer of octane.
 - (b) named as a butane but is an isomer of octane.
 - (c) named as a pentane but is an isomer of heptane.
 - (d) named as a hexane but is an isomer of octane.
 - (e) named as a pentane but is an isomer of hexane.
9. For $(\text{CH}_3)_2\text{CHCH}(\text{CH}_3)\text{CH}_2\text{CH}(\text{CH}_2\text{CH}_3)\text{CH}_2\text{CH}_2\text{CH}_3$, the longest unbranched chain of carbon atoms is
- (a) 8
 - (b) 6
 - (c) 7
 - (d) 9
 - (e) 12
10. The name of $\text{C}(\text{CH}_3)_4$ is
- (a) isopropyl methane
 - (b) 2-methylbutane
 - (c) isobutylmethane
 - (d) 2,2-dimethylpropane
 - (e) pentane
11. The compound 4-ethyl-2-hexene contains
- (a) 7 carbon atoms and 14 hydrogen atoms.
 - (b) 6 carbon atoms and 12 hydrogen atoms.
 - (c) 8 carbon atoms and 18 hydrogen atoms.
 - (d) 6 carbon atoms and 14 hydrogen atoms.
 - (e) 8 carbon atoms and 16 hydrogen atoms.
12. The compound 1-chloro-1-pentene
- (a) has the formula $\text{C}_5\text{H}_7\text{Cl}$.
 - (b) has the formula $\text{C}_5\text{H}_{11}\text{Cl}$.
 - (c) is an alkane.
 - (d) has 3 structural isomers.
 - (e) exists as *cis* and *trans* isomers.

13. The product of the hydrogenation of *cis*-2-butene is

- (a) 2-butyne
- (b) butane
- (c) *trans*-2-butane
- (d) *cis*-butane
- (e) *trans*-butane

14. The compound 2-methyl-2-pentene

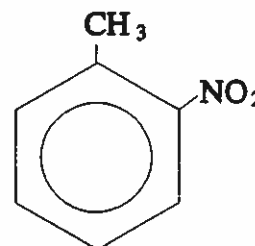
- (a) has 2 structural isomers each of which can be *cis* or *trans*.
- (b) exists as *cis* and *trans* isomers.
- (c) has 3 structural isomers.
- (d) has no structural or geometric isomers.
- (e) has 5 structural isomers.

15. The addition of HBr to 2-butene gives

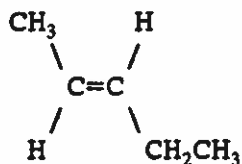
- (a) 2-bromo-1-butene.
- (b) 1-bromobutane.
- (c) 2-bromobutane.
- (d) 2-bromo-2-butene.
- (e) butane.

16. Name the compound shown to the right:

- (a) 2-methyl-3-nitrobenzene
- (b) 1-nitro-2-methylbenzene
- (c) nitrotoluene
- (d) 1-methyl-2-nitrobenzene
- (e) nitrobenzene

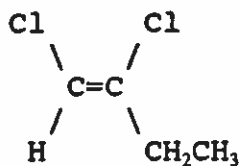


17. Name the following compound



- (a) *trans*-2-pentene
- (b) *cis*-2-pentene
- (c) *trans*-1-ethyl-1-propene
- (d) *trans*-1-methyl-1-butene
- (e) ethylmethylethene

18. Name the following compound



- (a) *cis*-1,2-dichloro-2-ethylethene
 - (b) *trans*-1,2-dichloro-1-butene
 - (c) *cis*-1,2-dichloro-1-butene
 - (d) *cis*-2-ethyl-1,2-dichloroethene
 - (e) dichlorobutene
19. The product of the reaction of *cis*-2-butene with bromine is

- (a) 2,3-dibromobutane
- (b) *cis*-2-bromobutane
- (c) *trans*-2-bromobutane
- (d) *cis*-2,3-dibromobutane
- (e) 2,2-dibromobutane

20. Cyclohexane

- (a) has delocalized electrons.
- (b) is planar.
- (c) undergoes hydrogenation.
- (d) can adopt both a "chair" and a "boat" conformation.
- (e) has the formula C_6H_{14} .

21. Which of the following is an unsaturated hydrocarbon?

- (a) cyclohexane
- (b) $\text{CH}_3\text{CH}(\text{Cl})\text{CH}_3$
- (c) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_3$
- (d) $\text{CH}_3\text{CHCHCH}_2\text{CH}_3$
- (e) $\text{CH}_3\text{C}(\text{CH}_3)_2\text{CH}_2\text{CH}(\text{CH}_3)_2$

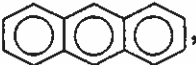
22. The hydroxyl group occurs in

- (a) alcohols, phenols and carboxylic acids.
- (b) aldehydes and ketones.
- (c) carboxylic acids and ketones.
- (d) phenols, aldehydes and ketones.
- (e) alcohols and aldehydes.

23. The carbonyl group occurs in all of the following except
- (a) aldehydes
 - (b) amides
 - (c) carboxylic acids
 - (d) phenols
 - (e) ketones
24. The ester $\text{CH}_3(\text{CH}_2)_2\text{C}(\text{O})\text{O}(\text{CH}_2)_4\text{CH}_3$ is responsible for the odor of bananas. It can be prepared from
- (a) $\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{OH}$ and $\text{CH}_3(\text{CH}_2)_3\text{CH}_2\text{OH}$
 - (b) $\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{OH}$ and $\text{CH}_3(\text{CH}_2)_3\text{COOH}$
 - (c) $\text{CH}_3(\text{CH}_2)_2\text{CHO}$ and $\text{CH}_3(\text{CH}_2)_3\text{CH}_2\text{OH}$
 - (d) $\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{OH}$ and $\text{CH}_3(\text{CH}_2)_3\text{CHO}$
 - (e) $\text{CH}_3(\text{CH}_2)_2\text{COOH}$ and $\text{CH}_3(\text{CH}_2)_3\text{CH}_2\text{OH}$
25. When an ester is formed via a condensation reaction with the elimination of water, the oxygen atom in the water molecule comes from
- (a) the aqueous solution.
 - (b) the carbonyl group of the acid.
 - (c) the alcohol.
 - (d) the hydroxyl group of the acid.
 - (e) the aldehyde.

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- The answer that fits the formula $\text{CH}_3\text{CH}_2\text{Cl}$ is
 - chloromethane
 - ethyl chloride
 - ethylene chloride
 - vinyl chloride
 - none of these.
- The answer that fits the formula $\text{CH}_3\text{CH}_2\text{Cl}$ is
 - alkyl chloride
 - chloromethane
 - ethylene chloride
 - vinyl chloride
 - none of these.
- Which of the following is the correct equation for the formation of acetylene from calcium carbide?
 - $\text{CaC}_2 + 2 \text{H}_2 \rightarrow \text{CH} \equiv \text{CH} + 2\text{Ca}$
 - $\text{CaC}_2 + 2 \text{H}_2 \rightarrow \text{CH}_2 = \text{CH}_2$
 - $\text{Ca}_2\text{C}_2 + 4 \text{H}_2\text{O} \rightarrow \text{CH}_2 = \text{CH}_2 + 2 \text{Ca}(\text{OH})_2$
 - $\text{CaC}_2 + 2 \text{H}_2\text{O} \rightarrow \text{CH} \equiv \text{CH} + \text{Ca}(\text{OH})_2$
 - none of these.
- The name of this compound, , is:
 - naphthalene
 - phenanthrene
 - triphenyl
 - tribenzyl
 - anthracene
- Which of the following will show geometric isomerism?
 - $\text{CH}_3\text{CH} = \text{CH}_2$
 - $\text{CH}_3\text{CH}_2\text{CH} = \text{CHCH}_2\text{CH}_3$
 - $(\text{CH}_3)_2\text{C} = \text{C}(\text{CH}_3)_2$
 - $\text{CH}_2 = \text{CHCH}_2\text{CH}_2\text{CH}_3$
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$

6. Isopropyl alcohol, $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$, is a
- primary alcohol
 - secondary alcohol
 - tertiary alcohol
 - glycol
 - none of these.
7. An example of a tertiary alcohol is
- $(\text{CH}_3)_3\text{C}-\text{OH}$
 - $(\text{CH}_3)_2\text{C}=\text{O}$
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}-\text{OH}$
 - $(\text{CH}_3)_2\text{CH}-\text{O}-\text{CH}_2\text{CH}_2\text{CH}_3$
 - none of these.
8. The tenth member of the alkanes has
- 20 hydrogen atoms
 - 10 hydrogen atoms
 - 12 hydrogen atoms
 - 22 hydrogen atoms
 - 18 hydrogen atoms
9. The chief product when 2-butanol is heated with 50% sulfuric acid at 100°C is
- $\text{CH}_3\text{CH}=\text{CHCH}_3$
 - $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$
 - $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)\text{H}-\text{O}-\text{C}(\text{CH}_3)\text{HCH}_2\text{CH}_3$
 - $\text{CH}_3\text{CH}_2\text{COCH}_3$
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
10. Which of these alcohols will not give a ketone when oxidized?
- 1-pentanol
 - 2-pentanol
 - 3-pentanol
 - 2-butanol
 - 2-hexanol
11. $\text{CH}_3\text{CH}_2-\text{NH}-\text{CH}_3$ is named:
- hydrogen methylethyl nitride
 - methylethyl amide
 - methylethyl ammonia
 - methylethyl cyanide
 - methylethylamine

12. Which of the following statements is(are) true?

- I. A methane molecule is composed of a carbon atom bonded to four hydrogen atoms. All five atoms lie in the same plane, and all bond angles are 90° .
- II. Alkanes are also known as paraffins or saturated hydrocarbons.
- III. Isobutane is named 2-methylpropane by the IUPAC naming system.
- IV. The general formula for an alkane is C_nH_{2n+2} .
- V. The products of the complete combustion of a hydrocarbon are carbon dioxide and water.
- VI. The compound, 2,2,5,5-tetramethylhexane, contains 12 carbon atoms.

- (a) All the above statements are true.
- (b) II, III, IV and V are true.
- (c) Only II and IV are true.
- (d) II, III, V and VI are true.
- (e) None of the above statements is true.

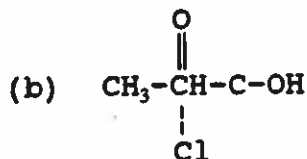
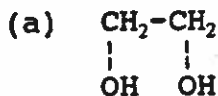
13. Which one of the following molecules does *not* contain a double bond?

- (a) CH_3CHO
- (b) CH_3CH_2OH
- (c) CO_2
- (d) CH_3CHCH_2
- (e) SO_2

14. How many different butyl alcohols are there?

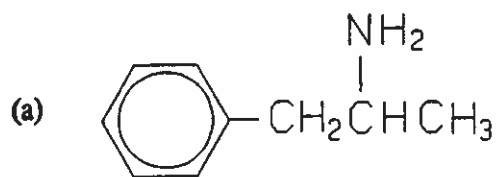
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) 5

15. Which of the following compounds displays optical isomerism?

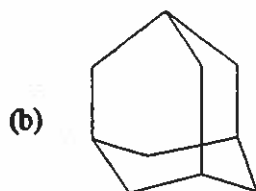


- (c) $CH_2=CHCl$
- (d) $CHCl=CHCl$
- (e) $CH_3-O-C_2H_5$

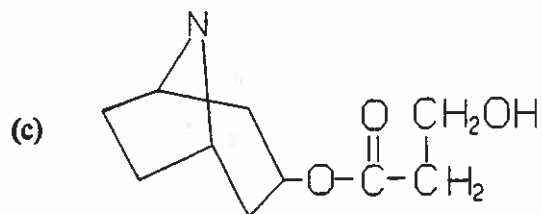
16. Which of the following drugs are not optically active?



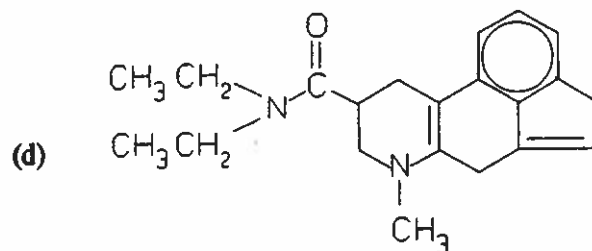
Benzedrine



Symmetrel



Atropine



Lysergic acid diethylamide - LSD

(e) none of these.

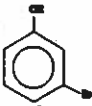
17. Which of the following statements is(are) true?

- I. A double bond consists of two equivalent bonds called pi bonds.
- II. When hydrogen chloride reacts with $\text{CH}_2=\text{CH}_2$, the product is $\text{CH}_2=\text{CHCl}$.
- III. The compound $\text{CH}_3\text{CH}=\text{CHCH}_3$ can have *cis-trans* isomers.
- IV. The reactions of benzene show that it has three double bonds.
- V. There is free rotation around a carbon-carbon double bond.
- VI. 2-butene and 2-methyl-2-butene can both have *cis-trans* isomerism.
- VII. Modern theory of the benzene structure includes π -bonding above and below the plane of the hexagon, and between all adjacent carbon atoms.

- (a) All the above statements are true.
- (b) I, II, IV, V and VII are true.
- (c) Only III and VI are true.
- (d) Only III and VII are true.
- (e) None of the above statements is true.

18. Which of the following statements is(are) true?

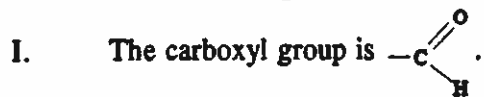
- I. Glycerol (glycerine) is a trihydroxy alcohol.
- II. Alcohols have higher boiling points than ethers of comparable molecular weight.
- III. Ethanol and dimethyl ether are isomers.
- IV. Ethylene glycol is the major component of "permanent" types of antifreezes.

V. The compound, , is called *m*-bromophenol.

VI. CH_3OH is commonly called wood alcohol.

- (a) All the above statements are true.
- (b) I, II, IV and VI are true.
- (c) Only IV and VI are true.
- (d) III, IV and VI are true.
- (e) None of the above statements is true.

19. Which of the following statements is(are) *not* true?



- II. An amine has the general formula R-NH₂.
- III. Carboxylic acids become less water soluble as the number of carbon atoms increases.
- IV. Low and intermediate molecular weight esters usually have fragrant or fruity characteristic odors.
- V. A soap or synthetic detergent is able to clean oil and grease because part of the molecule is highly water soluble and the other part, a long carbon chain, is soluble in the oil or grease.
- VI. Ring compounds in which all the atoms of the ring itself are not alike are called heterocyclic compounds.
- VII. A compound of formula C₆H₁₂O cannot be a carboxylic acid.
- (a) All the above statements are false.
- (b) Only VII is false.
- (c) Only I is false.
- (d) II, III, and VII are false.
- (e) None of the above statements is false.

