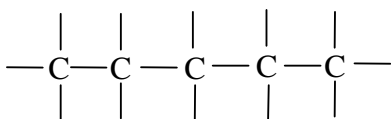


**MULTIPLE-CHOICE QUESTIONS FOR THE FACULTIES OF MEDICINE AND DENTAL
MEDICINE
- ORGANIC CHEMISTRY –
SEPTEMBER 2014**

1. The combustion of a hydrocarbon will produce mandatory:

- A. SO₂
- B. CO₂
- C. CO
- D. SO₃
- E. NO₂

2. How many secondary carbon atoms contain the following hydrocarbon chain?



- A. n = 5
- B. n = 3
- C. n = 0
- D. n = 2
- E. n = 1

3. How many of the following substances: CH₂O; CH₃OH; CH₃I; C₂H₄; (CH₃)₂NH; C₂H₄O₂ contain nular carbon atom?

- A. 5
- B. 1
- C. 2
- D. 3
- E. 4

4. The carbon atom presents the following types of hybridization in its combinations:

- A. sp³
- B. sp²
- C. sp², sp³
- D. sp
- E. sp³, sp², sp

5. Which of the following substances presents only primary carbon atoms in its structure?

- A. methane
- B. acetylene
- C. ethane
- D. propane
- E. methylcyclohexane

6. The separation process of a solid component of a mixture, based on its property to pass through heating direct from the solid phase into the gaseous phase, without melting, is called:

- A. crystallization
- B. decantation
- C. sublimation
- D. distillation

E. extraction

7. The separating process of the components of a mixture, based on the differences between the boiling points of the components, is possible by:
- extraction
 - distillation
 - sublimation
 - decantation
 - crystallization
8. Which of the following substances: (I) naphthalene, (II) ethanol, (III) triolein, (IV) glucose, (V) amylopectin, (VI) glutamic acid, does not dissolve in water?
- I, III, VI
 - I, III, V
 - II, IV, IV
 - I, IV
 - V, VI
9. Which of the following substances presents type sp hybridization?
- oleic acid
 - stearic acid
 - crotonic acid
 - hydrogen cyanide
 - acrylic acid
10. The linear alkanes cannot participate to reactions of:
- addition
 - dehydrogenation
 - oxidation
 - substitution
 - thermal decomposition
11. When burning one mole of cyclopentane is obtained:
- one mole of water
 - five moles of water
 - seven moles of water
 - six moles of water
 - no water is obtained
12. Which of the following is a branched chain hydrocarbon?
- ethene
 - 2-methyl-2-butene
 - 2-butene
 - 2-pentene
 - propene
13. The molar ratio phenanthrene : hydrogen, when phenanthrene is completely hydrogenated, is:
- 1:1
 - 1:2
 - 1:3
 - 1:5
 - 1:7

14.

The compound with the formula $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{C}-\text{OH} \\ | \\ \text{CH}_3 \end{array}$ is a:

- A. primary alcohol
- B. secondary alcohol
- C. tertiary alcohol
- D. enol
- E. quaternary alcohol

15. Which of the following compounds forms, by hydrolysis, a secondary alcohol?

- A. tert-butyl chloride
- B. neopentyl chloride
- C. allyl chloride
- D. n-butyl chloride
- E. sec-butyl chloride

16. The cresols are:

- A. ortho-, meta- and para- methylphenols
- B. ortho-, meta- and para-dimethylbenzene
- C. ortho-, meta- and para-diphenols
- D. 1,2,3-triphenols
- E. 1,3,5-triphenols

17. Which of the following compounds reacts with an aqueous solution of sodium hydroxide?

- A. methane
- B. propanol
- C. phenol
- D. benzene
- E. acetylene

18. What can result by the reduction of an aldehyde?

- A. a primary alcohol
- B. a secondary alcohol
- C. a carboxylic acid
- D. a compound with a mixed function alcohol – aldehyde
- E. a compound with a mixed function acid – aldehyde

19. What can result by the reduction of a ketone?

- A. a primary alcohol
- B. a secondary alcohol
- C. a carboxylic acid
- D. a compound with a mixed function alcohol – ketone
- E. a compound with a mixed function acid – ketone

20. With Tollens reagent, aldehydes suffer a reaction of:

- A. oxidation
- B. hydrogenation
- C. reduction
- D. condensation
- E. none of the above reactions

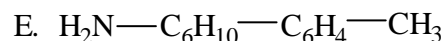
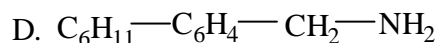
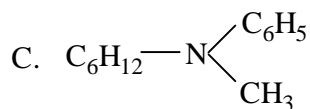
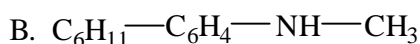
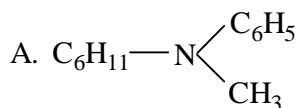
21. The formic acid has the following characteristic chemical property, unlike the other saturated carboxylic acids:

- A. is the weakest acid
- B. has reducing character
- C. has oxidant character
- D. sublimates easily
- E. has no special chemical property

22. Which of the following compounds: ethers (I); esters (II); acid anhydrides (III); nitriles (IV); amides (V) form, in the reaction with water, carboxylic acids?

- A. all of them
- B. II, III, IV, V
- C. III, IV, V
- D. II, IV, V
- E. I, III, V

23. The substance phenyl-methyl-cyclohexylamine has the formula:



24. In the process of the reduction of nitro derivatives, in the presence of iron and hydrochloric acid, the role of iron is:

- A. to give protons in aqueous solution.
- B. to give electrons.
- C. to split homolitically the molecules of the acid.
- D. to form the active centers of the catalysis.
- E. to form FeCl_3 , the electrophile catalyst of the reaction.

25. The water solubility of aniline increases in case of adding:

- A. NaOH
- B. HCl
- C. NH_3
- D. CH_3Cl
- E. NaCl

26. Urea is transformed, by hydrolysis, in:

- A. $\text{CO} + \text{NH}_3$
- B. $\text{CO}_2 + \text{NH}_3$
- C. $\text{H}-\text{COOH} + \text{NH}_3$
- D. urea does not hydrolyze
- E. $\text{HCN} + \text{NH}_3$

27. The polyamides can be obtained by the condensation of:

- A. monoamides with monocarboxylic acids
- B. diamides with dicarboxylic acids
- C. monoamines with monocarboxylic acids
- D. diamines with dicarboxylic acids
- E. diamides with diesters

28. Acids are chemical species able to:

- A. give molecules
- B. give atoms
- C. give protons
- D. give molecular hydrogen
- E. give water

29. Regarding pH, the following statement is true:

- A. It is a parameter characterizing the strength of an acid or a base.
- B. It is a characteristic of each acid or base.
- C. It is a measure of the concentration of H^+ in an aqueous solution.
- D. It has different values if the substance is solid or gaseous.
- E. Each substance has a different pH.

30. Regarding pH, the following statement is true:

- A. When mixing an acid and a base, the mixture that results has the $pH = 14$.
- B. The sum of pH values of substances in a solution is always equal to 14.
- C. The add of small quantities of acid or base to a buffer solution does not change significantly its pH.
- D. The solution of a weak acid has high values of pH.
- E. Mixing in any proportions a strong acid with water gives solutions with the same pH.

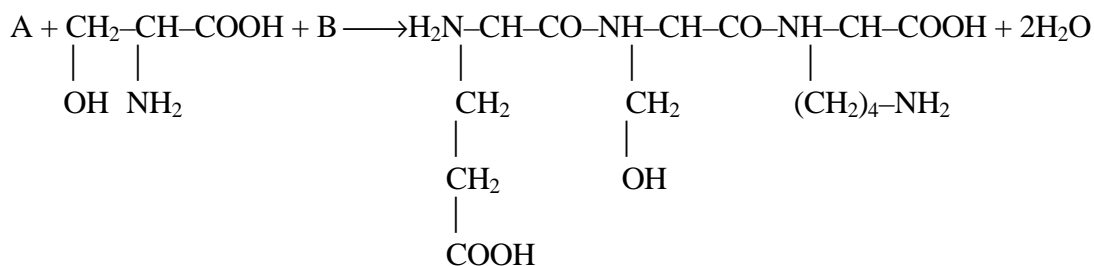
31. The following amino acid contains sulfur in its molecule:

- A. Glycine
- B. Valine
- C. Lysine
- D. Cysteine
- E. Serine

32. The following substance contains 3 oxygen atoms in the molecule:

- A. Glycine
- B. Glutamic acid
- C. Serine
- D. Lysine
- E. Cysteine

33. Considering the transformation:



The substance B is:

- A. Lysine
- B. Aspartic acid
- C. Glutamic acid
- D. Serine
- E. Cysteine

34. The number of water molecules, eliminated when a molecule of heptapeptide is formed, is:

- A. 5
- B. 7
- C. 6
- D. 8
- E. 12

35. In phosphorproteins, the phosphoric acid is bound to hydroxyl groups by bonds of type:

- A. ether
- B. ionic
- C. carbonyl
- D. carboxyl
- E. ester

36. Serine is:

- A. a monoamino-monocarboxylic aromatic acid
- B. a monoamino-dicarboxylic acid
- C. a diamino-monocarboxylic acid
- D. a hydroxylated amino acid
- E. a thiol amino acid

37. Which of the following substances can give diesters:

- A. lysine
- B. serine
- C. glycine
- D. alanine
- E. valine

38. The amino acid that has hydrocarbon branch chain is:

- A. lysine
- B. cysteine
- C. glutamic acid
- D. serine
- E. valine

39. The monosaccharides are:

- A. polyhydroxyaldehydes
- B. polyhydroxyketones
- C. both polyhydroxyaldehydes and polyhydroxyketones
- D. polyols
- E. polyhydroxylic acids

40. The glycosidic hydroxyl is bound to the carbon atom in:

- A. position 1 of fructose and position 2 of glucose
- B. position 2 of glucose and position 2 of fructose
- C. position 2 of fructose and position 1 of glucose
- D. position 2 of fructose and position 3 of glucose
- E. None of the above answers is correct.

41. Starch is identified with:

- A. Tollens reagent
- B. ferric chloride
- C. iodine
- D. a basic solution of copper sulfate
- E. Fehling reagent

42. The alcoholic fermentation is a reaction of:

- A. dehydration
- B. hydrolysis
- C. esterification
- D. catalyzed enzymatically
- E. transposition

43. Which of the following compounds, from the monosaccharide class, reduces the Tollens reagent?

- A. acetaldehyde
- B. fructose
- C. glyceraldehyde
- D. dihydroxyacetone
- E. amylose

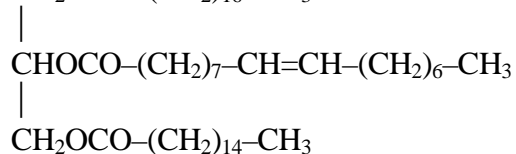
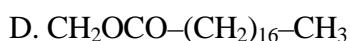
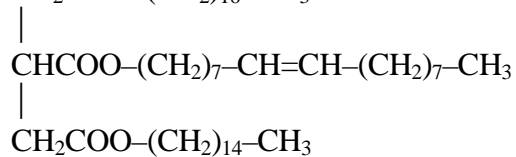
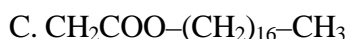
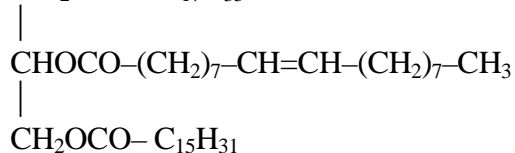
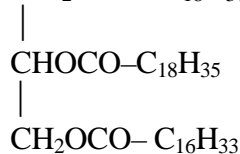
44. Ribose is a:

- A. aldotetrose
- B. ketotetrose
- C. ketopentose
- D. aldopentose
- E. aldohexose

45. β -Fructose is a component of:

- A. amylose
- B. amylopectin
- C. maltose
- D. sucrose
- E. cellulose

46. The formula of stearyl-oleoyl-palmitoylglycerol is:



E. None of the above formulas.

47. The iodine number (value) of a fat is:

- A. milligrams of iodine bound to one gram of fat
- B. milligrams of iodine bound to one mole of fat
- C. milligrams of iodine bound to 10 grams of fat
- D. milligrams of iodine bound to 100 grams of fat
- E. None of the above answers is correct.

48. Which of the following compounds can react with iodine?

- A. acetic acid
- B. phenylacetic acid
- C. oleic acid
- D. benzoic acid
- E. stearic acid

49. Which of the following compounds forms, by hydrolysis, carboxylic acids?

- A. collagen
- B. glycine
- C. cellulose
- D. glycerides
- E. glucides

50. Which of the following compounds is readily soluble in water?

A. triolein

B. stearic acid

C. dioleoyl-palmitin

D. sodium stearate

E. oleic acid

ANSWERS

| | | | |
|----|----------|----|----------|
| 1 | B | 26 | B |
| 2 | B | 27 | D |
| 3 | A | 28 | C |
| 4 | E | 29 | C |
| 5 | C | 30 | C |
| 6 | C | 31 | D |
| 7 | B | 32 | C |
| 8 | B | 33 | A |
| 9 | D | 34 | C |
| 10 | A | 35 | E |
| 11 | B | 36 | D |
| 12 | B | 37 | B |
| 13 | E | 38 | E |
| 14 | C | 39 | C |
| 15 | E | 40 | C |
| 16 | A | 41 | C |
| 17 | C | 42 | D |
| 18 | A | 43 | C |
| 19 | B | 44 | D |
| 20 | A | 45 | D |
| 21 | B | 46 | B |
| 22 | B | 47 | E |
| 23 | A | 48 | C |
| 24 | B | 49 | D |
| 25 | B | 50 | D |

51. A hydrocarbon with 4 carbon atoms may have in the structure:

- A. only nular carbon atoms (not directly connected to another carbon)
- B. only primary carbons
- C. only tertiary carbons
- D. all carbon types
- E. aromatic rings

52. How many of the following substances may contain nular carbon atoms (not directly connected to another carbon): CH_2O ; $\text{C}_2\text{H}_6\text{O}$; CH_3I ; C_2H_4 ; $\text{C}_2\text{H}_7\text{N}$; $\text{C}_2\text{H}_2\text{O}_4$.

- A. 3 B. 1 C. 2 D. 4 E. 5

53. An acyclic carboxylic acid having the molecular weight 118 and 54,24 % oxygen contains a number of carbons atoms equal to:

- A. 1 B. 2 C. 3 D. 4 E. 5

54. Phenylacetylene contains:

- A. 1 quaternary carbon atom B. 6 tertiary carbon atoms C. 3 quaternary carbon atoms
- D. 5 tertiary carbon atoms E. 1 quaternary carbon atom and 7 tertiary carbon atoms

55. In vinylacetylene the hybridization of the carbon atoms is:

- A. sp^3 and sp^2 B. sp^3 and sp C. sp^2 and sp D. sp^2 E. sp

56. Sublimation may be used as a separation method for the following mixture:

- A. benzoic acid + water B. naphthalene + NaCl C. phenol + ethanol
D. aniline + ethanol E. starch + cellulose

57. Distillation may be used as a separation method for the following mixture:

- A. glycogen + cellulose B. Benzoic acid + water C. naphthalene + NaCl
D. acetone+ acetic acid E. proteins + phenol

58. The pyrolysis of a hydrocarbon leads to the formation of other two, each being the second in it's homologous serie. The pyrolyzed hydrocarbon is:

- A. n-butane B. isobutane C. n-pentane
D. propane E. ethane

59. The number of saturated organic compounds which are produced by the thermal decomposition of n-pentane, supposing that carbon-carbon and carbon-hydrogen bonds are broken, is:

- A. 2 B. 3 C. 4 D. 5 E. 6

60. The number of organic compounds produced by the thermal decomposition of butane, is:

- A. 4 B. 5 C. 6 D. 7 E. 8

61. An alkane with more than 3 carbon atoms may undergo the fallowing reactions: addition (I), oxidation (II), substitution (III), reduction (IV), isomerization (V):

- A. I și II B. II, III, și V C. III, IV și V D. I, IV și V E. II, III și IV

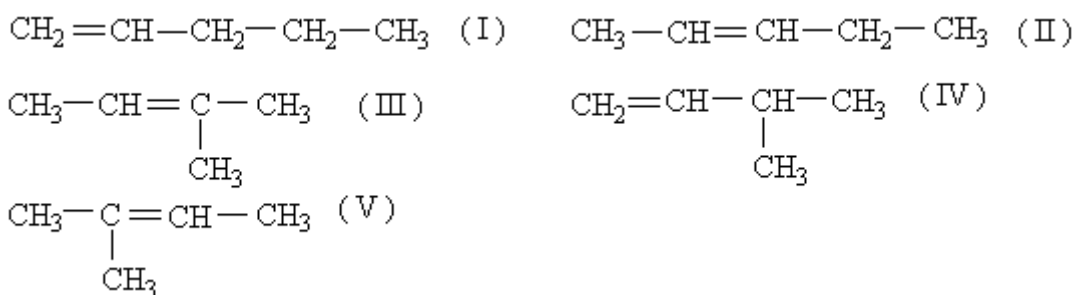
62. Regarding the addition of water at a terminal alkyne with more than 3 carbon atoms, it can be said:

- A. a dialdehyde is formed B. a symetric diketone is formed
C. this reaction doesn't take place D. methyl-alkyl-ketones are formed
E. the isomerization to the corresponding aldehyde takes place

63. The combustion of one mole of methylcyclopentane produces :

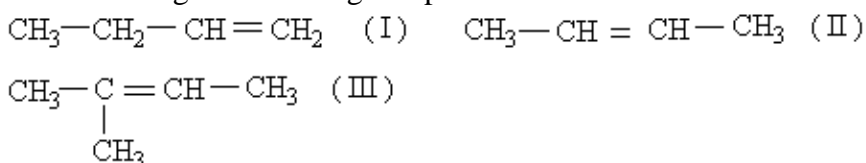
- A. one mole of water B. six moles of water C. seven moles of water
D. five moles of water E. water is not formed

64. The oxidation with potassium manganate (VII) of an alkene with the molecular formula C_5H_{10} , produces carbon dioxide besides other compounds. The oxidized alkene is:



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

65. Considering the following compounds:



Which of these substances will produce only acetic acid after the oxidation with $\text{K}_2\text{Cr}_2\text{O}_7$ in H_2SO_4 solution :

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

66. The alkene which by oxidation with $\text{K}_2\text{Cr}_2\text{O}_7$ and sulfuric acid forms only acetone is:

- A. 2-methyl-2-butene B. 3-hexene C. 2,3-dimethyl-2-butene
D. 2-methyl-2-pentene E. 1-butene

67. The gastric fluid has an acidic pH because of the high content of hydrochloric acid. If the pH value of the gastric fluid is 2, which will be the concentration of the hydrochloric acid?

- A. 2 % B. 0,2 M C. 0,01 M D. 2 M E. 2 g / litre

68. An acidic solution must be prepared by dissolving an aminoacid into water. Which will be the most appropriate aminoacid?

- A. aminoacetic acid
B. 2-aminopropionic acid
C. 2-aminopentandioic acid
D. 2,6-diaminohexanoic acid
E. 2-amino-3-hydroxypropionic acid

69. In a 2L volumetric flask are found 500 mL hydrochloric acid solution 0,06 M. 0.01 moles sodium hydroxide are added, then the volumetric flask is filled with water to the sign. Which will be the pH of the final solution?

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

70. An aminoacid is dissolved in a strongly acidic solution. Sodium hydroxide is added gradually until the solution becomes strongly basic. The aminoacid will suffer the following transformations:

- A. zwitterion \longrightarrow cation \longrightarrow anion

- B. zwitterion \longrightarrow anion \longrightarrow cation
 C. cation \longrightarrow anion \longrightarrow zwitterion
 D. cation \longrightarrow zwitterion \longrightarrow anion
 E. anion \longrightarrow zwitterion \longrightarrow cation

71. A tripeptide is dissolved in a strongly acidic aqueous solution, obtained by the condensation of lysine, isoleucine and alanine. Which will be the electric charge of the tripeptide dissolved in the solution?

- A. +3 B. +2 C. +1 D. -1 E. -3

72. The number of mixed tripeptides which can be formed from glycine and beta-alanine is:

- A. 2 B. 3 C. 5 D. 6 E. 8

73. Complete hydrolysis of a tripeptide generates three natural monocarboxylic aminoacids with the molecular weight 75,89 and 121 respectively. The tripeptide may be constituted by :

- A. alanine, glycine, serine B. valine, glycine, alanine C. alanine, glycine, cysteine
 D. phenylalanine, valine, glycine E. lysine, glycine, alanine

74. The nitrogen content of glycerides is:

- A. 6,5–7,5% B. 15,5–18,5% C. 20% D. 0,5–2%
 E. none of the above is correct

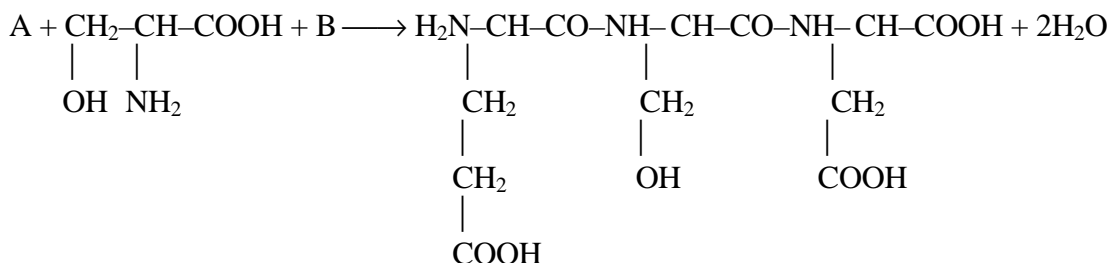
75. Glycine may be obtained by the reaction of ammonia in excess with:

- A. chloroacetic acid B. α -chloropropanoic acid
 C. 3-chloropropanoic acid D. 2-bromopropanoic acid
 E. Glycine is a natural aminoacid and, consequently it cannot be chemically synthesized

76. Aspartic acid cannot react with:

- A. α -alanine B. methanol C. methylamine
 D. hydrochloric acid E. benzene

77. Considering the following transformation:



The substance B is:

- A. lysine B. aspartic acid C. glutamic acid
 D. serine E. cysteine

78. The aminoacids can be transformed in primary amines using the following reaction:

- A. hydrolysis B. decarbonilation C. reduction D. oxidation E. decarboxilation

79. The glycoside hydroxyl group is bound to carbon atom at:

- A. the position 1 of fructose and the position 2 of glucose
- B. the position 2 of glucose and the position 2 of fructose
- C. the position 2 of fructose and the position 1 of glucose
- D. the position 2 of fructose and the position 3 of glucose
- E. all the previous affirmations are false

80. The false statement for glucose and fructose is:

- A. Both are monohexose.
- B. In the cyclic form, both have 4 asymmetric carbons.
- C. Both are decomposed at high temperature.
- D. Both show the anomeric phenomena.
- E. Both produce hexitol by a reduction reaction.

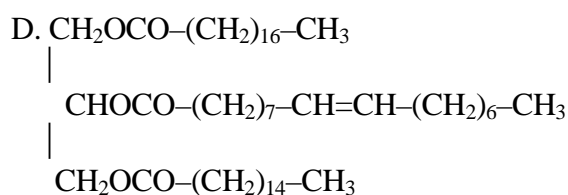
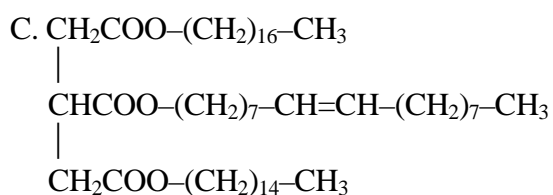
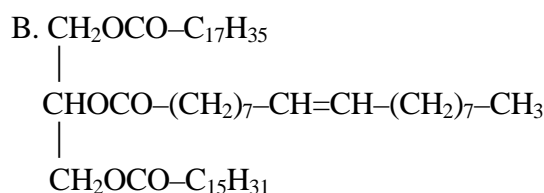
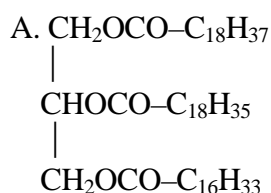
81. For monosaccharides the next affirmation is true:

- A. Are polyhydroxiethers .
- B. Are polyhydroxiesters .
- C. Can be mono or poly unsaturated
- D. They have a pair number of carbons atoms.
- E. They are polyhydroxialdehydes or polyhydroxiketones .

82. The alcoholic fermentation of glucose produces ethanol and carbon dioxide. The ratio between ethanol and glucose is:

- A. 1:2
- B. 2:1
- C. 1:1
- D. 2:3
- E. 1:3

83. The stearyl- oleoyl-palmitine is:



E. nici una din formulele prezentate

84. Total hydrolysis of 2 moles of dioleostearine in alkaline medium produces:

- A. 3 moles of fatty acids
- B. 184 g glycerol
- C. 306 g sodium stearate
- D. 6 moles of saturated fatty acids
- E. 608 g sodium oleate

85. Total hydrolysis of 1 mole of trioleine produces:

- A. 3 moles of glycerine
- B. 184 g glycerol
- C. 304 g sodium oleate
- D. 3 moles oleic acid
- E. 608 g sodium oleate

86. It forms carboxylic acids by hydrolysis:

- A. collagen
- B. glyocol
- C. cellulose
- D. glycerides
- E. carbohydrates

87. Which of the following compounds is the most soluble in water?

- A. trioleine B. stearic acid C. dioleo-palmitine
D. sodium stearate E. oleic acid

88. The fatty acid with formula $C_{14}H_{28}O_2$ is:

- A. palmitoleic acid B. miristic acid C. dodecanoic acid
D. lauric acid E. palmitic acid

89. The fatty acid with formula $C_{12}H_{24}O_2$ is:

- A. palmitoleic acid B. miristic acid C. dodecanoic acid
D. decanoic acid E. palmitic acid

90. The chemical reaction with hydrogen of the palmito-oleo-stearine produces:

- A. oleo-dipalmitine B. stearo-dipalmitine
C. stearo-dioleine D. palmito-dioleine
E. palmito-distearine

91. Which of the following soaps (stearic acids salts) has the best washing capacity?

- A. $(R-COO)_2Pb$ B. $(R-COO)_3Al$ C. $(R-COO)_2Ca$
D. $(R-COO)_2Mn$ E. $R-COONa$

92. An aldotetrose has a number of pairs of enantiomers equal to:

- A. 2 B. 4 C. 8 D. 16 E. 32

93. A ketotetrose has a number of pairs of enantiomers equal to:

- A. 1 B. 2 C. 4 D. 8 E. 16

94. A ketopentose has a number of enantiomers equal to:

- A. 2 B. 4 C. 8 D. 16 E. 32

95. An aldopentose has a number of enantiomers equal to:

- A. 2 B. 4 C. 8 D. 16 E. 32

96. H_2 does not react with any of the isomers of the following molecular formulas:

- A. C_2H_4 B. C_2H_2 C. C_6H_6 D. C_4H_{10} E. C_5H_8

97. In which of the following reactions a C-C bond is broken:

- A. $CH_3-CHO + H_2 \longrightarrow CH_3-CH_2-OH$
B. $CH_3-CN + 2H_2 \longrightarrow CH_3-CH_2-NH_2$
C. $C_6H_5-CH_3 + 3H_2 \longrightarrow C_6H_{11}-CH_3$
D. $C_6H_5-NO_2 + 3H_2 \longrightarrow C_6H_5-NH_2 + 2H_2O$
E. $C_6H_5-CH_3 + H_2 \longrightarrow C_6H_6 + CH_4$

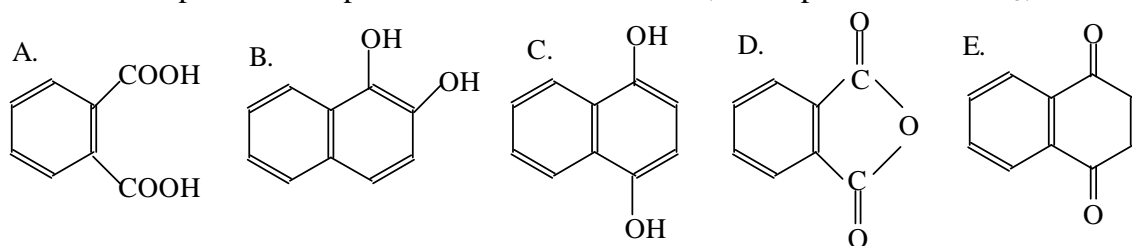
98. In the oxidation of isoprene with potassium dichromate in sulphuric acid medium results:

- A. ketopropionic acid, CO_2 and water B. ketopropanal and formic acid
C. methyl-vinyl-ketone, carbon dioxide and water D. 2-methyl-1,2,3,4-buthane-tethrol
E. acrylic acid and acetalehyde

99. The oxidation product of glucose with Tollens reagent has a number of asymmetric carbons equal with:

- A. 2 B. 3 C. 4 D. 5 E. 6

100. The final product of naphthalene oxidation with O_2 , in the presence of V_2O_5 , at $350^\circ C$, is:



| | | | | | | | | | |
|----|---|----|---|----|---|----|---|-----|---|
| 51 | C | 61 | B | 71 | B | 81 | E | 91 | E |
| 52 | D | 62 | D | 72 | D | 82 | B | 92 | A |
| 53 | D | 63 | B | 73 | C | 83 | B | 93 | A |
| 54 | B | 64 | B | 74 | E | 84 | B | 94 | B |
| 55 | C | 65 | B | 75 | A | 85 | D | 95 | C |
| 56 | B | 66 | C | 76 | E | 86 | D | 96 | D |
| 57 | D | 67 | C | 77 | B | 87 | D | 97 | E |
| 58 | C | 68 | C | 78 | E | 88 | B | 98 | A |
| 59 | B | 69 | A | 79 | C | 89 | C | 99 | C |
| 60 | D | 70 | D | 80 | B | 90 | E | 100 | D |

REFERENCES

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