

CHEM 102 Practice Final Exam

This practice final is an example of the types of questions and the content areas that will be covered. Please note each semester is different so some of the content may not have been covered in class. For example, the amount of metabolism that is covered each year varies. Not all content areas are covered in this practice final.

- Which element normally forms 3 bonds?
a. oxygen b. bromine c. nitrogen d. carbon
- Which of these properties is characteristic of organic compounds?
a. bonding that is mostly ionic
b. a melting point above 300 ° C
c. generally slow reactions
d. insolubility in organic solvents
- Hydrocarbons that contain at least one triple bond are called
a. aromatic b. alkanes c. alkenes d. alkynes
- The compound $\text{CH}_3(\text{CH}_2)_5\text{CH}_3$ is called
a. hexane b. isohexane c. heptane d. octane
- In propane the carbon in position 2 is
a. primary b. secondary c. tertiary d. quaternary
- Among these compounds, which are isomers?
 - $\text{CH}_3\text{CH}_2\text{-O-CH}_3$
 - $\text{CH}_3\text{CH}_2\text{-O-CH}_2\text{CH}_3$
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
 - $\text{CH}_2=\text{CH-O-CH}_3$a. 1 and 3
b. 2 and 3
c. 1 and 2
d. 1 and 4
- In naming alkyl halides containing four different halogens, which prefix is cited first?
a. fluoro b. chloro c. bromo d. iodo
- In which of these solvents are alkanes least soluble?
a. benzene b. chloroform c. water d. dimethyl ether
- The combustion of one mole of cyclohexane, C_6H_{14} , produces how many moles of CO_2 ?
a. 3 b. 6 c. 12 d. 8
- In 2-butanol the $\text{CH}_3\text{CH}_2\text{CHCH}_3$ part of the molecule
a. is the functional group b. is the alcohol group c. is the alkyl group d. contains only primary carbons
- What functional groups are present in $\text{CH}_3\text{-C=CH-CH}_2\text{-OH}$?
a. alcohol and alkene b. ketone and alkene c. aldehyde and ketone d. alcohol and alkyne
- The most stable shape of the cyclohexane ring resembles a
a. chair b. table c. boat d. flat plane
- If you put a few drops of hexane on your finger and then wipe it off, you will feel the skin dry up. This happens because the hexane
a. is poisonous
b. protects the skin

- c. dissolves the natural skin oils
- d. extracts the water from the skin

14. Which statement is incorrect ?

- a. the accumulation of CO_2 in the atmosphere may cause the greenhouse effect
- b. CO_2 in the air reflects back the earth's infrared radiation
- c. the amount of CO_2 in our atmosphere is gradually increasing
- d. CO_2 , once formed, remains in the atmosphere forever

15. $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}=\text{CH}-\text{CH}=\text{CH}-\text{CH}_3$ is called

- a. 2,4,6-octene
- b. 2,4,6-octatriene
- c. 1,3,5-octadiene
- d. 3,5,7-octatriene

16. Which of the following alkenes shows cis-trans isomerism?

- a. 1,1-dibromobutene
- b. 1-pentene
- c. 2-methyl-2-octene
- d. 3-octene

17. When HCl is added to 1-methylcyclohexene the principal reaction product is

- a. 1-chloro-1-methylcyclohexane
- b. 1-chloro-2-methylcyclohexane
- c. 1-chloro-2-methylcyclohexene
- d. 3-chloro-2-methylcyclohexene

18. In the addition of HX to a double bond, the hydrogen goes to the carbon that already has more hydrogens. This is a statement of

- a. the double bond rule
- b. LeChatelier's principle
- c. Markovnikov's rule
- d. the rule of "less is better"

19. The addition polymer $-\text{CF}_2-\text{CF}_2-\text{CF}_2-\text{CF}_2-$ is called

- a. polystyrene
- b. polypropylene
- c. Teflon
- d. polyfluorobenzene

20. The polymer polyvinyl chloride is made by polymerizing which monomer?

- a. $\text{CH}_2-\text{CH Cl}$
- b. $\text{CH}_2=\text{CHCl}$
- c. $\text{CHCl}=\text{CHCl}$
- d. $\text{CH}=\text{CCl}$

21. The compound $\text{CH}\equiv\text{C}-\text{C}-\text{CH}_2-\text{CH}_2-\text{Cl}$ is called

- a. 1-chloro-4-pentyne
- b. 5-chloro-1-pentyne
- c. 5-chloro-1-pentene
- d. 1-chloro-3-pentyne

22. An example of an important triol is

- a. glycerol
- b. ethylene glycol
- c. methyl alcohol
- d. isopropyl alcohol

23. In the conversion of wine to vinegar

- a. ethyl alcohol is oxidized to acetic acid
- b. ethyl alcohol is reduced to acetic acid
- c. ethyl alcohol is oxidized to formic acid
- d. methyl alcohol is reduced to formic acid

24. Which compound is used as an antifreeze in automobiles?

- a. isopropyl alcohol
- b. glycerol
- c. ethanol
- d. ethylene glycol

25. The most important chemical property of phenols is

- a. they are weak bases
- b. they can be oxidized to ketones
- c. they are weak acids
- d. they are strong acids

26. Which of these is the least soluble in water?

- a. CH_3OH
- b. $\text{CH}_3\text{CH}_2\text{OH}$
- c. $\text{CH}_3(\text{CH}_2)_5\text{CH}_2\text{OH}$
- d. $\text{HOCH}_2(\text{CH}_2)_5\text{CH}_2\text{OH}$

27. Which of these has the lowest boiling point?

- a. $\text{CH}_3-\text{O}-(\text{CH}_2)_3\text{CH}_3$
- b. $\text{CH}_3(\text{CH}_2)_2\text{CH}_2\text{OH}$
- c. phenol
- d. $\text{HO}-\text{CH}_2\text{CH}_2-\text{OH}$

28. From a knowledge of which compounds form hydrogen bonds, we can conclude, comparing compounds of the same molecular weight, that
- alcohols are more soluble in water than ethers
 - alcohols have higher boiling points than ethers
 - alkyl chlorides have higher boiling points than alcohols
 - ethers have lower boiling points than alkanes
29. Which group of compounds is noted for their foul odors?
- phenols
 - ethers
 - alcohols
 - thiols
30. CFCs, such as Freon-12, formerly used in refrigerators and aerosol sprays, have been replaced by international agreement. This was done because CFCs
- destroy the protective ozone layer in the upper atmosphere
 - are poisonous
 - contain fluorine, which when released is poisonous
 - The statement is false. CFCs are still used in aerosol sprays.
31. The active ingredient in marijuana is
- diethyl ether
 - ethanol
 - phenol
 - tetrahydrocannabinol
32. The IUPAC name for acetone is
- propanal
 - ethanal
 - butanone
 - propanone
33. An aldehyde can form a hydrogen bond with
- an alcohol
 - a ketone
 - an ether
 - another aldehyde
34. When 2-methyl-2-propanol is treated with a mild oxidizing agent the oxidation product is
- an aldehyde
 - a ketone
 - an ether
 - there is no reaction
35. In Benedict's test
- an aldehyde is oxidized
 - a silver mirror forms
 - the copper(II) ion is oxidized
 - all of these
36. A hemiacetal has which of these groups on the same carbon?
- OH, OR, H, and R
 - two ORs, H, and R
 - two OHs and two Rs
 - two ORs and two Rs
37. This compound $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ is called
- propionic acid
 - palmitic acid
 - valeric acid
 - butyric acid
38. Which statement is true? Carboxylic acids
- have higher boiling points than alcohols or aldehydes of the same molecular weight
 - are all soluble in water
 - have weaker hydrogen bonds than alcohols
 - cannot form hydrogen bonds with another carboxylic acid
39. This compound $\text{CH}_3\text{CH}_2\text{COO K}$ is called potassium
- propionate
 - benzoate
 - acetate
 - butyrate
40. Which of these compounds is most soluble in water?
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COO Na}$
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
41. The base-catalyzed hydrolysis of carboxylic esters is called

- a. dehydration b. esterification c. saponification d. acidification

42. The two monomers used to manufacture Dacron are

- a. ethylene glycol and succinic acid
b. ethylene glycol and terephthalic acid
c. glycerol and terephthalic acid
d. glycerol and succinic acid

43. An example of a primary amine is

- a. $\text{CH}_3\text{-NH-CH}_2\text{CH}_3$ b. $(\text{CH}_3)_2\text{NH}$ c. $\text{CH}_3\text{CH}_2\text{NH}$ d. $(\text{CH}_3)_3\text{N}$

44. Which of these is diethylamine?

- a. $\text{CH}_3\text{CH}_2\text{NH}$
b. $\text{CH}_3\text{CH}_2\text{NHCH}_2\text{CH}_3$
c. $\text{NH}_2\text{CH}_2\text{CH}_2\text{NHCH}_2\text{CH}_2\text{NH}_2$
d. $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$

45. The boiling point of ethylamine is higher than that of propane but lower than that of 1-propanol. This means that

- a. a molecule of ethylamine cannot form a hydrogen bond with another molecule of itself
b. hydrogen bonds between two amino groups are weaker than those between two alcohol groups
c. the intermolecular attraction between two amine molecules is merely dipole-dipole interaction
d. the intermolecular interaction between two amines is of an ionic nature

46. Which of these is most soluble in water?

- a. $\text{CH}_3\text{CH}_2\text{CH}_2\text{NHCH}_3$
b. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2$
c. $(\text{CH}_3\text{CH}_2)_3\text{N}$
d. $\text{NH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2$

47. The product formed when HCl reacts with $(\text{CH}_3)_2\text{NH}$ is

- a. $\text{CH}_3\text{CH}_2\text{NH}_2\text{Cl}$
b. $\text{CH}_3\text{NH}_2\text{Cl}$
c. $(\text{CH}_3)_2\text{NH}_2\text{Cl}$
d. $(\text{CH}_3)_2\text{NCl}$

48. Amides are

- a. acidic b. basic c. neutral d. some are basic, some neutral

49. The designation HCl as in Neo-Syneprine HCl on the label of a decongestant drug means the drug

- a. contains hydrochloric acid
b. is an amine and is present in the form of its salt
c. was extracted from a plant using HCl
d. is not pure

50. Nylon belongs to a class of polymers known as

- a. polyamides b. polyesters c. polystyrenes d. polyethylenes

51. A dextrorotatory substance

- a. rotates unpolarized light
b. is given the symbol (-)
c. rotates the plane of polarized light clockwise
d. rotates the plane of polarized light counterclockwise

52. A mixture of equal amounts of a pair of enantiomers is called

- a. an anomer b. a diastereomer c. a racemic mixture d. a chiral mixture

53. In the Fischer projection the two bonds represented by horizontal lines

- a. come out at you from the plane of the paper
b. go behind the plane of the paper
c. are in the plane of the paper

d. are sometimes in the plane and sometimes not

54. Which statement is true? Chiral molecules

- a. have cis and trans isomers
- b. contain only chiral carbon atoms
- c. do not rotate the plane of polarized light
- d. cannot be superimposed on their mirror images

55. All properties of a pair of enantiomers are identical except

- 1. they have different specific heats
 - 2. they rotate the plane of polarized light by different amounts
 - 3. they rotate the plane of polarized light in different directions
 - 4. they react at different rates with chiral compounds
 - 5. they react at different rates with all compounds, chiral and nonchiral
- a. 1 and 4
 - b. 2 and 4
 - c. 3 and 4
 - d. 2 and 5

56. Which carbon atom in beta - D -glucose is the hemiacetal carbon?

- a. C-1
- b. C-4
- c. C-5
- d. C-6

57. beta - D -glucose and alpha - D -glucose are

- a. enantiomers
- b. anomers
- c. disaccharides
- d. a racemic mixture

58. An example of a nonreducing sugar is

- a. lactose
- b. glucose
- c. fructose
- d. sucrose

59. The complete hydrolysis of glycogen yields only

- a. maltose
- b. fructose
- c. glucose
- d. ribose

60. Which polysaccharide has only alpha (1- 4) glycosidic linkages?

- a. cellulose
- b. glycogen
- c. amylose
- d. amylopectin

61. The water-repellent property of lipids is expressed by the word

- a. hydrophilic
- b. hydrophobic
- c. hydraulic
- d. hydroponic

62. In unsaturated fatty acids the double bonds are

- a. all cis
- b. all trans
- c. both cis and trans
- d. cis-trans isomerism does not apply

63. Heating a fat with water and which of these reagents will make a soap?

- a. NaOH
- b. HCl
- c. HNO
- d. CaCl

64. When the alcohol sphingosine is linked to a fatty acid by an amidelinkage, the combination is called

- a. ceramide
- b. cerebroside
- c. ganglioside
- d. myelin

65. All steroids contain at least how many rings?

- a. 1
- b. 2
- c. 3
- d. 4

66. Which hormone is the precursor of the other sex hormones as well as of the adrenocorticoid hormones?

- a. testosterone
- b. progesterone
- c. estradiol
- d. cortisol

67. RU486 is a drug used to

- a. decrease prostaglandin levels in blood
- b. decrease cholesterol levels in blood
- c. decrease sugar levels in blood
- d. prevent implantation of a fertilized ovum

68. Bile salts are

- a. sex hormones
- b. emulsifying agents
- c. membrane components
- d. anti-inflammatory

69. The common precursor of prostaglandins and leukotrienes is
a. cholesterol b. oleic acid c. arachidonic acid d. progesterone
70. Which part of the soap molecules penetrates the greasy dirt particles?
a. the hydrophobic tail
b. the hydrophilic head
c. the carboxylate ion
d. the sodium ion
71. Multiple sclerosis is a disease caused by the
a. demyelination of nerve cells
b. deposits of cholesterol in the brain
c. depletion of phosphoglycerides in the brain
d. improper accumulation of glycolipids in the brain
72. All amino acids found in proteins are L -amino acids except
a. glutamic acid b. glutamine c. serine d. glycine
73. Which of these is a basic amino acid?
a. glycine b. lysine c. cysteine d. valine
74. The pH at which the positive and negative charges of an amino acid balance each other is called the
a. isotonic point b. isobaric point c. isosbestic point d. isoelectric point
75. The sequence of the amino acids in a protein is which kind of structure?
a. primary b. secondary c. tertiary d. quaternary
76. Secondary structures of proteins are held together by hydrogen bonding between the
a. C= O and N-H of a backbone
b. C= O of a backbone and the N-H of a side chain
c. two N-H groups of a backbone
d. C= O of a side chain and the N-H of a backbone
77. Which structure is not affected by the denaturation of a protein?
a. primary b. secondary c. tertiary d. quaternary
78. The difference between normal and sickle cell hemoglobin is in which structure?
a. primary b. secondary c. tertiary d. quaternary
79. Curly hairs are the result of cross-linking of keratins by
a. disulfide linkages b. salt bridges c. hydrogen bonds d. hydrophobic interactions
80. The protein portion of an enzyme is called
a. a cofactor b. a coenzyme c. an apoenzyme d. a proenzyme
81. An enzyme that is activated when a portion of the chain is removed is called
a. an inhibitor b. a zymogen c. an activator d. none of these
82. An explanation for the mechanism of competitive inhibition of an enzyme is that
a. both the substrate and the inhibitor fit into the active site
b. only the inhibitor fits into the active site
c. the substrate fits into the active site even though the inhibitor changes the shape of the enzyme by attachment to another site
d. only the substrate fits into the active site

83. The active site of pyruvate kinase contains two cofactors, K^+ and Mg^{2+} , which help to
a. transfer carboxyl groups from phosphoenolpyruvate
b. cleave ATP
c. decarboxylate the pyruvate
d. anchor the negatively charged sites of the substrate

84. Sulfa drugs act as competitive inhibitors of bacterial enzymes that need the coenzyme
a. vitamin A b. folic acid c. vitamin B d. vitamin C

85. What is the mode of the antibacterial action of penicillin?
a. it inhibits the transpeptidase that makes bacterial cell walls rigid
b. it kills all bacteria that do not need a cell wall
c. it prevents folic acid synthesis by bacteria
d. it inhibits protein synthesis by bacteria

86. The process of building up molecules in the body is called
a. metabolism b. anabolism c. catabolism d. all of these

87. In the molecule ATP, the A stands for
a. alanine b. adenine c. adenosine d. acetic acid

88. All of these statements are true except
a. the citric acid cycle is also called the Krebs cycle
b. when NAD is reduced, it is converted to NADH
c. when ADP is converted to ATP energy is given off
d. the common catalytic pathway takes place in the mitochondria

89. The C_2 fragment that enters the citric acid cycle is
a. fumarate b. acetyl CoA c. oxaloacetate d. succinate

90. How many CO_2 molecules are produced in one full turn of the citric acid cycle?
a. 1
b. 2
c. 3
d. it depends on which compound enters the cycle

91. Cytochrome b is
a. a proton translocating enzyme
b. located in the cytoplasm
c. part of the citric acid cycle
d. part of the electron transport system

92. Carbohydrates are stored in the liver and muscles in the form of
a. monosaccharides b. glycogen c. amylose d. cellulose

93. The metabolic pathway in which glucose is converted to lactic acid is called
a. gluconeogenesis b. glycolysis c. transamination d. glycogenolysis

94. The urea cycle is part of the catabolism of
a. carbohydrates b. lipids c. amino acids d. glycerol

95. The amino acid that is not metabolized in the disease called PKU is
a. leucine b. proline c. phenylalanine d. glycine

96. Biosynthetic processes, in general,
a. produce ATP
b. use up ATP
c. produce GTP instead of ATP
d. produce acetyl CoA instead of ATP

97. Photosynthesis is a process that
- takes place in animal tissues only
 - synthesizes fatty acids with the aid of sunlight
 - uses up oxygen and produces carbon dioxide
 - produces carbohydrates from CO and H O
98. In gluconeogenesis
- glucose is synthesized from pyruvate
 - glucose is broken down into two C fragments
 - glucose is built into glycogen
 - glucose is converted to galactose
99. In an animal cell hereditary information is located in the
- cytosol
 - mitochondria
 - nucleus
 - cell membranes
100. DNA is a polymer of
- nucleosides
 - nucleotides
 - bases
 - deoxyribose
101. This formula represents the pairing of which bases?
- G-C
 - A-C
 - A-T
 - G-T
102. All of these statements describe the differences between DNA and RNA except
- DNA is double stranded; RNA is single stranded
 - DNA has thymine; RNA has uracil
 - DNA has deoxyribose; RNA has ribose
 - DNA has one phosphate for each sugar; RNA has two phosphates for each sugar.
103. The DNA replication process is called
- conservative
 - semiconservative
 - liberal
 - both b and c
104. Ribosomes are small spherical bodies
- made of RNA and proteins
 - residing in the nucleus of a cell
 - made of RNA only
 - made of DNA and RNA
105. The statement "The information contained in DNA is transferred to RNA and then from RNA to the structure of proteins" is called the
- one gene, one enzyme hypothesis
 - genetic code
 - the central dogma of molecular biology
 - Chargaff rule
106. A codon is a triplet of
- bases on mRNA
 - bases on tRNA
 - bases on DNA
 - amino acids in the ribosome
107. When the methionine tRNA binds to its codon to the mRNA and the mRNA is attached only to the 40S ribosome, the process is called

a. initiation b. elongation c. termination d. activation

108. In the elongation step of protein synthesis, the binding of tRNA takes place on
a. the DNA molecule
b. the P-site of the 60S ribosome
c. the 40S ribosome
d. the A-site of the 60S ribosome

109. Histones are
a. the noncoding sequences of DNA
b. the coding sequences of DNA
c. the spliced exons in the mature mRNA
d. the basic proteins in the nucleosomes

110. When the blood reaches which of these pH values would a patient be said to have the condition called alkalosis?
a. 6.4 b. 7.2 c. 7.42 d. 7.8

ANSWER KEY FOR TEST- A:\102FINAL

1. c	2. c	3. d	4. c	5. b
6. a	7. c	8. c	9. b	10. c
11. a	12. a	13. c	14. d	15. b
16. d	17. a	18. c	19. c	20. b
21. b	22. a	23. a	24. d	25. c
26. c	27. a	28. b	29. d	30. a
31. d	32. d	33. a	34. d	35. a
36. a	37. d	38. a	39. a	40. b
41. c	42. b	43. c	44. b	45. b
46. d	47. c	48. c	49. b	50. a
51. c	52. c	53. a	54. d	55. c
56. a	57. b	58. d	59. c	60. a
61. b	62. a	63. a	64. a	65. d
66. b	67. d	68. b	69. c	70. a
71. a	72. d	73. b	74. d	75. a
76. a	77. a	78. a	79. a	80. c
81. b	82. a	83. d	84. b	85. a
86. b	87. c	88. c	89. b	90. b
91. d	92. b	93. b	94. c	95. c
96. b	97. d	98. a	99. c	100. b
101. c	102. d	103. b	104. a	105. c
106. a	107. a	108. d	109. d	110. d