

College of Science

Department of Chemistry

Competition Exam for

Post-graduate Students Candidates

Biochemistry/ 2015-2016

Multiple choices (20degree):

1- At the isoelectric pH of a tetra peptide:

- A) Only the amino and carboxyl termini contribute charge.
- B) The amino and carboxyl termini are not charged.
- C) The total net charge is zero.
- D) There are four ionic charges.

2- The chirality of an amino acid results from the fact that its α -carbon:

- A) Has no net charge.
- B) Is a carboxylic acid.
- C) Is bonded to four different chemical groups.
- D) Is in the L absolute configuration in naturally occurring proteins.

3-When two carbohydrates are epimers:

- A) One is a pyranose, the other a furanose.
- B) One is an aldose, the other a ketose.
- C) They differ in length by one carbon.
- D) They differ only in the configuration around one carbon atom.
- E) They rotate plane-polarized light in the same direction.

4-The double helix of DNA in the B-form is stabilized by:

- A) Covalent bonds between the 3' end of one strand and the 5' end of the other.
- B) Hydrogen bonding between the phosphate groups of two side-by-side strands.
- C) Hydrogen bonds between the riboses of each strand.
- D) Nonspecific base-stacking interaction between two adjacent bases in the same strand.

5-Which of the following statements is not true concerning glycolysis in anaerobic muscle?

- A) Fructose 1,6-bisphosphatase is one of the enzymes of the pathway.
- B) It is an endergonic process.
- C) It results in net synthesis of ATP.
- D) It results in synthesis of NADH.

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6-The main function of the pentose phosphate pathway is to:

- A) Give the cell an alternative pathway should glycolysis fail.
- B) Provide a mechanism for the utilization of the carbon skeletons of excess amino acids.
- C) Supply NADH.
- D) Supply pentoses and NADPH.

7-The conversion of 1 mol of pyruvate to 3 mol of CO₂ via pyruvate dehydrogenase and the citric acid cycle will yield _____ mol of NADH, _____ mol of FADH₂, and _____ mol of ATP (or GTP).

- A) 2; 2; 2
- B) 3; 1; 1
- C) 3; 2; 0
- D) 4; 1; 1
- E) 4; 2; 1

8-Histones are _____ that are usually associated with _____.

- A) Acidic proteins; DNA
- B) Acidic proteins; RNA
- C) Basic proteins; DNA
- D) Basic proteins; RNA
- E) Coenzymes derived from histidine; enzymes

9-Which one of the following statements about enzymes that interact with DNA is true?

- A) E. coli DNA polymerase I is unusual in that it possesses only a 5' 6 3'
- B) exonucleolytic activity.
- C) Endonucleases degrade circular but not linear DNA molecules.
- D) Exonucleases degrade DNA at a free end.
- E) Many DNA polymerases have a proofreading 5' 6 3' exonuclease.

10-Which of the following molecules or substances contain, or are derived from, fatty acids?

- A) Prostaglandins
- B) Sphingolipids
- C) Triacylglycerols
- D) All of the above contain or are derived from fatty acids.

11- Which of the following is not true of sterols?

- A) Cholesterol is a sterol that is commonly found in mammals.
- B) They are commonly found in bacterial membranes.
- C) They are precursors of steroid hormones.
- D) They have a structure that includes four fused rings.

12-The fluidity of a lipid bilayer could be increased by:

- A) Decreasing the number of unsaturated fatty acids.
- B) Decreasing the temperature.
- C) Increasing the length of the alkyl chains.
- D) Increasing the temperature.

13- Amino acids are monomers of

- A) Disaccharides.
- B) Proteins.
- C) Nucleotides.
- D) Steroids.

14- The overall shape of a single chain of amino acids in a protein is that protein's

- A) Primary structure.
- B) Secondary structure.
- C) Tertiary structure.
- D) Quaternary structure.

15- DNA stores

- A) Fat.
- B) Carbohydrates.
- C) Energy.
- D) Hereditary information.

16- ATP (adenosine triphosphate) stores energy in the bonds between its

- A) Hydrogen atoms.
- B) Carbon atoms.
- C) Nucleotides.
- D) Phosphate groups.

17- An enzyme

- A) Is used up in a reaction.
- B) Raises the activation energy of a reaction.
- C) Bonds with an active site on a substrate molecule.
- D) Lowers the activation energy of a reaction.

18- The disaccharide that most people think of as table sugar is

- A) Sucrose.
- B) Lactose.
- C) Maltose.
- D) Fructose.

19- The complex carbohydrate (polysaccharide) that is digested to the monosaccharide, glucose, and is found in vegetables, fruits, and grains and is called

- A) Maltose.
- B) Starch.
- C) Glycogen.
- D) Cellulose.

20- Triglycerides that contain one or more double covalent bonds between carbon atoms of their fatty acids are called

- A) Saturated fats.
- B) Cholesterol
- C) Phospholipids.
- D) Unsaturated fats.

21- A toxic waste product of protein metabolism that must be excreted from the body is

- A) Ammonia.
- B) Carbon dioxide.
- C) Urea.
- D) Uric acid.

22- The energy-requiring process by which small molecules are joined to form larger molecules is specifically called

- A) Metabolism.
- B) Anabolism.
- C) Catabolism.
- D) Enzymatic reactions.

- 23- The energy molecule of the cell is
- A) Starch.
 - B) Glycogen.
 - C) Glucose.
 - D) ATP.
- 24- Excess glucose after a meal will first form glycogen in a process called
- A) Glycolysis.
 - B) Glycogenesis.
 - C) Lipogenesis.
 - D) Lipolysis.
- 25- In glycolysis, glucose is converted to:
- A) CO_2 and H_2O .
 - B) Pyruvate.
 - C) Citrate.
 - D) Acetyl coA.
- 26- Under anaerobic conditions, the end-product of glycolysis is converted to
- A) CO_2 and H_2O .
 - B) Amino acids.
 - C) Lactic acid.
 - D) Hydrochloric acid.
- 27- Protons received from NADH
- A) Act as coenzymes
 - B) Are passed along the electron transport chain along with the electrons
 - C) Are the terminal electron acceptors
 - D) Are pumped outside the cell
- 28- A fatty acid with 14 carbon atoms will undergo _____ cycles of beta oxidation
- A) 7
 - B) 4
 - C) 5
 - D) 6
- 29- Which of the following is not a dietary antioxidant?
- A) Vitamin B
 - B) Vitamin K
 - C) beta-carotene
 - D) Vitamin E
- 30- Which statement best describe the oxidation of odd chain fatty acids
- A) Additional specific enzymes are needed for the oxidative process.
 - B) One carbon is removed in one cycle
 - C) End product is propionyl CoA
 - D) Hydroxyl fatty acids are produced.
- 31- People on strict diets or that have Type I Diabetes may check their urine periodically for ketones. Excessive production of ketones in the urine may indicate excessive
- A) Carbohydrate metabolism.
 - B) Protein metabolism.
 - C) Lipid metabolism.
 - D) Lactic acid production.
- 32- Aerobic resynthesis of ATP occurs:
- A) In the mitochondria in a process called glycogenolysis
 - B) In the mitochondria in a process called oxidative phosphorylation
 - C) In the cytosol
 - D) In the sarcoplasmic reticulum

- 33- The process of breaking down triacylglycerol into free fatty acids and glycerol is called:
- A) Beta oxidation
 - B) Lipogenesis
 - C) Lipolysis
 - D) Both (A) and (C) are correct
 - E) None of the above are correct
- 34- Most of the free fatty acids are transported in the blood:
- A) Inside the red blood cells
 - B) As lipoproteins
 - C) Combined with glucose
 - D) Bound to albumin
 - E) Bound to antibodies
- 35- The beta oxidation of a molecule of palmitic acid, $\text{CH}_3(\text{CH}_2)_{14}\text{CO}_2\text{H}$:
- A) Yields 8 molecules of acetyl-CoA and some ATP and water
 - B) Yields 16 molecules of acetyl-CoA only
 - C) Yields carbon dioxide and water only
 - D) Uses more ATP than it generates
- 36- How many CO_2 and ATP molecules are formed during one complete turn of the tricarboxylic acid cycle (Krebs' cycle)?
- A) 2CO_2 and 2ATP
 - B) 2CO_2 and 16ATP
 - C) 2CO_2 and 12ATP
 - D) 2CO_2 and 1ATP
- 37- The oxidative deamination of the amino acid (Alanine) in muscle produces:
- A) One molecule of pyruvate and a molecule of ammonia
 - B) One molecule of pyruvate and a molecule of carbon dioxide
 - C) One molecule of pyruvate and another amino acid
 - D) One molecule of pyruvate and a molecule of water
- 38- The transcription of DNA to a molecule of messenger RNA occurs:
- A) On the ribosomes
 - B) In the cytosol
 - C) In the nucleus
 - D) When amino acids are made available by transfer RNA
- 39- Codons are composed of:
- A) Triplet sequences of nucleotide bases in mRNA
 - B) Triplet sequences of nucleotide bases in DNA
 - C) Triplet sequences of amino acids in polypeptide chains
 - D) Triplet sequences of deoxyribose sugars in DNA
- 40- In a double stranded molecule of DNA, the ratio of purines :pyrimidines is:
- A) Variable
 - B) Determined by the base sequence in RNA
 - C) Always 1:1
 - D) Determined by the number of purines in the sense strand of the DNA

Organic chemistry/M.Sc.

Choose the right answer:

- 1) How many constitutional isomers in n-Hexane?
a) Five b) Four c) Six
- 2) In alkenes, the (Z) isomer, the higher- priority groups are in:
a) The opposite side b) The same side c) The same carbon
- 3) Halohydrins forms when halogene added to alkene in presence of:
a) Peroxide b) Water c) Alcohol
- 4) Dilute potassium permanganate oxidize the alkene to:
a) Diol b) Carboxylic acid c) Carboxylic acid and ketone
- 5) Radical substitution reaction mechanism require:
a) Two steps b) One step c) Three steps
- 6) The S_N2 mechanism occurs in:
a) One step with inversion b) One step with racemic mixture
c) Two steps with inversion
- 7) Aliphatic primary amine are:
a) Less basic than ammonia b) More basic than ammonia
c) Its basicity like ammonia
- 8) The acidity of phenol increase with:
a) Electron with drawing substituent b) Polar solvent
c) Electron release substituent
- 9) The more reactive carboxylic acid derivatives are:
a) Ester b) Acid chloride c) Acid an hydride
- 10) Reaction of ketones with Grignard reagent gives:
a) Primary alcohol b) Secondary alcohol c) Tertiary alcohol
- 11) Cannizzaro reaction gives:
a) Aromatic acid and alcohol b) Two aromatic acid
c) Two alcohol
- 12) Acetal formation occurs when:
a) Aldehyde react with alcohol b) Ketone react with alcohol
c) Aldehyde and ketone react with alcohol
- 13) Nucleophilic addition to α - β -unsaturated carbonyl compounds is according to:
a) Markovnikov addition b) Anti Markovnikov c) To β -position
- 14) Diels-Alder mechanism is:
a) Carbanion mechanism b) Carbocation mechanism
c) Concerted mechanism

- 15) Wittig reaction is between:
a) Carbonyl compounds and nitrile b) Carbonyl compounds and organo copper compounds c) Carbonyl compounds and ylide
- 16) Claisen condensation is between:
a) Two ketones b) Two aldehydes c) Two esters
- 17) Tollen's reagent gives positive test with:
a) Aldehydes b) Aldehydes and ketones c) Ketons
- 18) Huckel's rule is:
a) $4n+4 = \pi$ electrons b) $4n+2 = \pi$ electrons
c) $2n+4 = \pi$ electrons
- 19) Anthracene prepared from:
a) Benzene and succinic anhydride
b) Benzene and phthalic anhydride
c) Benzene and succinic amide
- 20) The Skraup synthesis is a method for synthesis of:
a) Quinoline b) Isoquinoline c) Pyridine

Thanaa AL-Mouamin

Good luck