

Bio202 current paper solved.

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.best of luck..

.Properties of nitrogen(5)

Properties of Nitrogenous Bases

- Aromatic: The Nitrogen containing bases are aromatic i.e. they have alternate double bonds
- Heterocyclic:
 - They are heterocyclic i.e. structures that contain other atoms in addition to carbon, such as nitrogen in the ring structure
 - The six-atom rings of purines and pyrimidines are numbered in opposite directions.
 - Weak Bases: Purines or pyrimidines with an $-NH_2$ group are weak bases
 - Functional Groups: The most important functional groups of pyrimidines and purines are
 - ring nitrogens
 - carbonyl groups
 - exocyclic amino groups
 - Hydrophobicity: • The purine and pyrimidine bases are hydrophobic and relatively insoluble in water at the near-neutral cell pH
 - Stacking Interaction: Hydrophobic stacking interactions in which two or more bases are positioned with the planes of their rings parallel (like a stack of coins) are one of two important modes of interaction between bases in nucleic acids.
 - Base stacking helps to minimize contact of the bases with water, and these interactions are very important in stabilizing the three-dimensional structure of nucleic acids.

1. Primary structure of DNA?(5)

The primary structure of a nucleic acid is its covalent structure and nucleotide sequence.

- The back bone of the primary structure is the linear strand made by sugar phosphate residues, linked together, while the bases project laterally. This way a long, un-branched chain is formed.

Primary structure is a huge linear polymer of dNTPs that are joined to each other by 5'-3' PDE bonds.

The resulting long, un-branched chain has polarity.

- Both 5'-end and 3'-end are free. at 5'-end there is a free phosphate. at 3'-end there is a free OH that are not attached to other nucleotides.
- Purines and pyrimidines project laterally from the backbone and forms a variable part. • The variable part is concerned with the expression of genetic information.

By convention, the structure of a single strand of nucleic acid is always written with the 5' end at the left and the 3' end at the right • that is, in the 5' to 3' direction

. • Some simpler representations of this penta deoxy ribonucleotide are • pA-C-G-T-A OH, • pApCpGpTpA, and finally 5'-ACGTA-3'.

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2. Function of t-RNA (3)

Transfer RNA (tRNA)

- t RNA is the smallest of the three major species of RNA (4S).
- They are single stranded globular molecules.
- They remain largely in cytoplasm.
- They are generated by nuclear processing of a precursor molecule.
- tRNAs compose roughly 20% of total cellular RNA
- There are at least 20 species of tRNA molecules in every cell.
- Although each specific tRNA differs from the others in its sequence of nucleotides, the tRNA molecules as a class have many features in common
- Primary structure
- t RNA molecules consist of 74-95 nucleotides in a particular sequence.
- The t RNA molecules contain not only the usual bases like adenine, guanine, cytosine, uracil but also contain unusual bases
- These unusual bases(also called modified bases) include
- Dihydrouracil • Pseudouridine
- Thymine.
- Secondary Structure Pseudouridine
- Each single stranded
- t RNA is folded extensively.
- Extensive intra chain base pairing which leads to a characteristic CLOVER-LEAF structure.

3. What is the simple lipid? Give two types (3)

-Simple lipids

- Esters of fatty acids with various alcohols
- These contain:
- Fats (and Oils) and Waxes.
- Fats: Esters of fatty acids with glycerol (Oils are fats in the liquid state)
- Waxes: Esters of fatty acids with higher molecular weight monohydric alcohols.
- (having one OH group)
- Triacylglycerols (TAGs)
- The simplest lipids constructed from fatty acids are the triacylglycerols,
- Also referred to as;
- triglycerides, fats, or neutral fats or storage lipids.

4. Give five properties of waxes ? (5)

• Properties of waxes

Waxes are insoluble in water, but

- soluble in fat solvents and are negative for acrolein test. very resistant to rancidity.

- Waxes are not easily hydrolyzed as the fats and are indigestible by lipases (enzymes responsible for fat digestion in body) •

Thus they are of no nutritional value

- Waxes are of two types:
- True waxes • Other Waxes or Non true waxes or Wax-like compounds
- True Waxes are solid simple lipids containing a monohydric alcohol (with a higher molecular weight than glycerol esterified to long-chain fatty acids.

5. Reaction order respect with substrate concentration? (5)

Reaction Orders with Respect to Substrate Concentration

Order	Rate Equation	Comments
Zero	Rate = k	Rate is independent of substrate concentration
First	First rate = k[S]	Rate is proportional to the first power of substrate concentration
Second	Rate = k[S1][S2]	Rate is proportional to the first power of each of two reactants

Order of Reaction

- When [S] is much less, then the velocity of the reaction is approximately proportional to the substrate concentration.
- The rate of reaction is then said to be first order with respect to substrate.
- When [S] is much greater than K_m the velocity is constant and equal to V_{max} .
- The rate of reaction is then independent of substrate concentration, and is said to be zero order with respect to substrate concentration

6. Difference between uracil and thymine? (2)

- Pyrimidines include: • Cytosine (C)—in both DNA and RNA
- Thymine (T)—only in DNA
- Uracil (U) —only in RNA
- Thymine becomes thymidine and deoxythymidine
- Uracil (U) becomes uridine and deoxyuridine depending on the type of sugar.
- Cytosine is 2-oxy-4-amino-pyrimidine
- Thymine is 2,4-dioxy-5-methyl-pyrimidine • Uracil is 2,4-dioxy-pyrimidine
- T and U differ by only one methyl group, which is present on T but absent on U

7. What do you know about kinetic enzymes? (2)

The study of chemical reactions that are catalysed by enzymes. In enzyme kinetics, we study about the reaction rate measure and the effect of change of condition.

8. What is the concentration of H in 0.1M NaOH? (3)

Solution:

$$K_w = [H^+][OH^-]$$

- With $[OH^-] = 0.1 \text{ M}$, solving for $[H^+]$ gives
- $[H^+] = K_w/[OH^-]$
 $= 1 \times 10^{-14} \text{ M}^2 / 0.1 \text{ M}$
 $= 10^{-14} \text{ M}^2 / 0.1 \text{ M}$

= 10-13M

9. Examples of hydrolases enzymes?

Common example of hydrolases are:

- Protein hydrolyzing Enzymes (peptidases).
- Carbohydrases
- Lipid hydrolyzing enzymes e.g. Lipases and Phospholipases.

10. Define neucleotide?

: Nucleotides are the building blocks of nucleic acids.

- Without them, DNA or RNA can not be produced.

Neucleotides are helpful in transmission of genetic information , in the synthesis of proteins and also act as energy currency in the cell

11. Describe induced fit hypothesis?

Some proteins can change their shape (conformation)

- When a substrate combines with an enzyme, it induces a change in the enzyme's conformation
- This change in conformation when the substrate binds is induced by multiple weak interactions with the substrate.
- There may also be rearrangements of covalent bonds during an enzyme-catalyzed reaction.
- This conformational change is referred to as induced fit.

12. Function of cAMP?

Acts as second messenger in the cell

- It has role in glycogen metabolism
- cAMP, glycogenolysis
- cAMP TAG metabolism
- cAMP lipolysis
- It decreases cholesterol synthesis
- It causes activation of protein kinases which in turn;
- activate or deactivate other enzymes.
- It regulates the cell membrane permeability, by increasing permeability of cell membrane
- to H₂O, Na⁺, K⁺ & Ca²⁺
- Moreover, it regulates
- insulin secretion,
- catecholamine biosynthesis & Melatonin synthesis

13. Coenzymes?

Some enzymes require no chemical groups for activity other than their amino acid residues.

- Whereas some enzymes require molecules other than proteins for enzymic activity.
- If it is a complex organic molecule or metallo-organic compound it is termed a coenzyme.

14. Neucleotide as intermediate carrier?

Carriers of intermediates: Nucleotides also serve as carriers of activated intermediates in the synthesis of some carbohydrates, lipids, and proteins.

- The sugar derivatives UDP-glucose and UDP-galactose participate in sugar inter conversions
- And in the biosynthesis of starch and glycogen
- Similarly, nucleoside-lipid derivatives such as CDP acylglycerol are intermediates in lipid biosynthesis.

15. DNA denaturation?

- Separation of the two strands of the double helix when hydrogen bonds between the paired bases are disrupted.

16. Differentiate between template and non-template DNA? (2)

Template and Non-template Strands

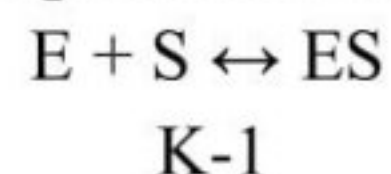
- The term template strand refers to the sequence of DNA that is copied during the synthesis of mRNA.
- The opposite strand is called the Non Template or coding strand or the mRNA-like strand

17. Function of cGMP? (3)

- Cyclic GMP is synthesized from GTP
- It serves as a second messenger in response to nitric oxide during relaxation of smooth muscle (especially blood vessels) so it has role in smooth muscle relaxation and vasodilatation.
- It also has role in
- Protein phosphorylation
- Neurotransmission
- Insulin action
- Regulation of sodium channels

18. Mochlis equation? (3)

- Leonor Michaelis and Maud Menten in 1913, proposed a simple model that accounts for most of the features of enzyme-catalyzed reactions.
- They postulated that the enzyme first combines reversibly with its substrate to form an enzyme-substrate complex in a relatively fast reversible step: k_1



- The ES complex then breaks down in a slower second step to yield the free enzyme (E) and the reaction product (P):



- Early in the reaction, the concentration of the product, [P], is negligible, and we make the simplifying assumption that the reverse reaction, $P \rightarrow S$ (described by k_{-2}), can be ignored

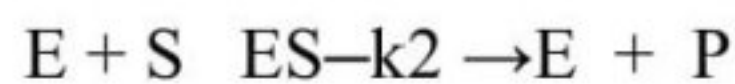
- This assumption is not critical but it simplifies our task.

The overall reaction then reduces to k_1 K_2



K-I

k1



k-1

E = Enzyme S = Substrate P = Product

ES = Enzyme-Substrate complex k1 rate constant for the forward reaction

k-1 = rate constant for the breakdown of the ES to substrate k2

= rate constant for the formation of the products

19. Effect of platelets PAF (5)

Platelets activating factor

- This is an unusual ether glycerophospholipid, with a saturated alkyl group in an ether link to carbon 1 and an acetyl residue (rather than a fatty acid) at carbon 2 of the glycerol backbone
- PAF is synthesized and released by a variety of cell types
- It binds to surface receptors, triggering potent thrombotic and acute inflammatory events
- It causes platelets to aggregate and degranulate (required for clotting), and neutrophils and alveolar macrophages to generate superoxide radicals (required for microbial killing)

20. Effect of PH in ionization of active site?

- The concentration of H⁺ affects reaction velocity in several ways.
- First, the catalytic process usually requires that the enzyme and substrate have specific chemical groups in either an ionized or un-ionized state in order to interact.
- For example, catalytic activity may require that an amino group of the enzyme be in the protonated form (–NH₃⁺).
- At alkaline pH, this group is deprotonated, and the rate of the reaction, therefore, declines.
- Extremes of pH can also lead to denaturation of the enzyme.

21. Lanoline?

Lanoline or wool fat is secreted by sheep sebaceous gland, and contains both free and esterified cholesterol e.g. cholesterol-palmitate

Lanoline secretion helps sheep in reducing water evaporation from skin.

It is used as industrial lubricant and in cosmetics.

22. Iodine number?

- The number of grams of iodine which will be absorbed by 100 grams of a fat is termed its iodine number.

23. Small and large km

- a. Small Km: A numerically small (low) Km reflects a high affinity of the enzyme for substrate, because a low concentration of substrate is needed to half-saturate the enzyme—that is, to reach a velocity that is 1/2 V_{max}
- b. Large Km: A numerically large (high) Km reflects a low affinity of enzyme for substrate because a high concentration of substrate is needed to half-saturate the enzyme

24. Hydrogenation

- It is the addition of Hydrogen at the double bonds of unsaturated fatty acids.
- Hydrogenation converts Unsaturated fatty acids to Saturated fatty acids.

25. Cofactor

- Some enzymes require no chemical groups for activity other than their amino acid residues.
- Whereas some enzymes require molecules other than proteins for enzymic activity. If the non-protein moiety is a metal ion such as Zn^{2+} or Fe^{2+} , it is called a cofactor.

26. Activation energy?

Energy required to start a chemical reaction is known as activation energy

27. Characteristics of palmitic acid?

Palmitic Acid(16:0) Palmitic acid, or hexadecanoic acid, is the

- most common saturated Fatty Acid found in animals, plants and microorganisms
- Palmitic acid mainly occurs as its ester in triglycerides (fats), especially palm oil.
- It is also found in high amounts in
 - Butter,
 - Cheese,
 - milk and
 - meat
- Excess carbohydrates in the body are converted to palmitic acid.
- Palmitic acid is the first fatty acid produced during fatty acid synthesis and the precursor to longer fatty acids
- As a consequence, palmitic acid is a major body component of fats found in the animals.

28. Pathway for the metabolism of arachdonic acid?

Omega-6 fatty acids

Linoleic acid (found in Vegetable oils, Safflower oil (GLA) → Dihomo-γ-Linolenic acid (DGLA) → (LA) gamma Linolenic acid Arachidonic acid (AA) (found in Meat Poultry Eggs)

Glactocylamide?

29. Neucleotide as the energy currency or cofactors?

- Energy currency: Nucleotides play an important role as "energy currency" in the cell.
- Nucleoside tri- and diphosphates such as ATP and ADP are the principal donors and acceptors of phosphoryl group in metabolism.
- By doing this, they play a key role in the energy transduction.
- This energy is used in almost every energy requiring process in the body, such as;
- Muscle contraction, Transmission of nerve impulse, Transports of nutrients across cell membrane Motility of spermatozoa And many more energy dependent processes

30. Pka value of acetic acid?

4.76

31. Steric acid has carbon number?

18

32. Types of RNA?

- There is a wide variety of RNAs,
- **messenger RNAs (mRNAs)**- transfer genetic information from DNA to the proteinsynthesizing machinery.
- **ribosomal RNAs (rRNAs)**- contribute to the formation and function of ribosomes
- **transfer RNAs (tRNAs)**- adapter molecules that carry specific amino acids for protein synthesis
- **small nuclear RNA (snRNA)**- play pivotal roles in RNA processing, particularly mRNA processing
- **ribozymes** — some RNA molecules have intrinsic catalytic activity these RNA enzymes, are called ribozyme

33. Neucleotide composition?

Nucleotides are composed of

- A nitrogenous base (purine or pyrimidine)
- A pentose monosaccharide
- One, two, or three phosphate groups
-
- Nitrogenous Bases
- The nitrogen-containing bases belong to two families of compounds:
- Purines
- Pyrimidines

34. Rancidity and factors?

- The chemical deterioration of fats.
- When lipid-rich foods are exposed too long to the oxygen in air, they may spoil and become foul smelling.
- It occurs particularly on aging after exposure to atmospheric oxygen, light, moisture, bacterial or fungal contamination and/or heat.
- Saturated fats resist rancidity more than unsaturated fats that have unsaturated double bonds.
- Rancidity is due to
- Oxidation • Hydrolysis • Oxidative Rancidity

35. Examples of cyclic neucleotide?

There are two important cyclic nucleotides:

- **Cyclic AMP cAMP**
- **Cyclic GMP cGMP**

36. How DNA intact duplex?

DNA Renaturation

- Under appropriate conditions (temp. & salt concentration), separated strands of DNA will renature or reassociate and form the double helix by the process called renaturation (or reannealing).
- This reannealing process is also referred to as hybridization.
- When the temperature or pH is returned to the range in which most organisms live, the

unwound segments of the two strands spontaneously rewind, or anneal, to yield the intact duplex

37. Three functional group of neucleotide?

- Functional Groups: The most important functional groups of pyrimidines and purines are
- ring nitrogens
- carbonyl groups
- exocyclic amino groups

38. Subgroups of oxyreductase?

) Oxidoreductases

- catalyze oxidation reduction reactions
- further divided into four subgroups;
- Oxidase,
- Dehydrogenases, • Hydroperoxidases
- Oxygenases.

39. VLDL?

VLDLs are assembled in the liver.

- composed predominantly of TAGs synthesized in liver and
- contain some cholesterol and cholesteryl esters
- As VLDL pass through the circulation, TAG is degraded and taken up by peripheral tissues in the form of fatty acids,
- causing the VLDL to decrease in size and become denser,
- called VLDL remnant.

40. Sterol?

Importantly, lipids provide the hydrophobic barrier that permits partitioning the aqueous contents of cells and subcellular structures as; phospholipids and sterols are the major structural elements of biological membranes.

41. Condensation reaction with example?

42. Xanthine oxidase?

- proteases hydrolyze proteins
- Modifiers may precede the name to indicate, for example,
- the substrate (xanthine oxidase),
- the source of the enzyme (pancreatic ribonuclease),
- its regulation (hormone-sensitive lipase)
- Where needed, alphanumeric designators are added to identify multiple forms of an enzyme e.g,
- RNA polymerase III
- protein kinase C

43. Define rate of reaction?

The reaction rate or rate of reaction is the speed at which a chemical reaction takes place, defined as proportional to the increase in the concentration of a product per unit time and to the decrease in the concentration of a reactant per unit time.

44. glucoceramides ? not confirm question due mis spelling sharing in group..

A mixture of new **glucoceramides** was obtained from the sea cucumber *A. molpadioides*, an echinoderm widely distributed in sandy coastal regions of China

45. Hexokinase?

Hexokinase catalyses the first step in glucose metabolism in most cells, the transfer of a phosphate from ATP to glucose to form glucose 6-phosphate.

- Hexokinase I, the isozyme in red blood cells has a low K_m for glucose of approximately 0.05 mM- helpful in utilizing blood glucose even when the blood glucose concentration is very low.

46. Pka value of lactic acid?

- Calculate the pKa of lactic acid, given that when the concentration of lactic acid is 0.01M and the concentration of lactate is 0.087 M, the pH is 4.80

- $pH = pK_a + \log \frac{[lactate]}{[lactic\ acid]}$

- $pK_a = pH - \log \frac{[lactate]}{[lactic\ acid]}$

$$= 4.80 - \log 0.087/0.01$$

$$= 4.80 - \log 8.7$$

$$= 4.80 - 0.94$$

$$= 3.9$$

47. Function of lipoxin?

- A series of reductions of the resultant hydro-per-oxy groups leads to the formation of tri-hydroxy derivatives of arachidonic acid known as the lipoxins.
-
- Lipoxins induce chemotaxis and stimulate superoxide radicals for killing of microorganisms
- Prostaglandins, thromboxanes, leukotrienes and lipoxins have very short half lives and rapidly degraded in the body.

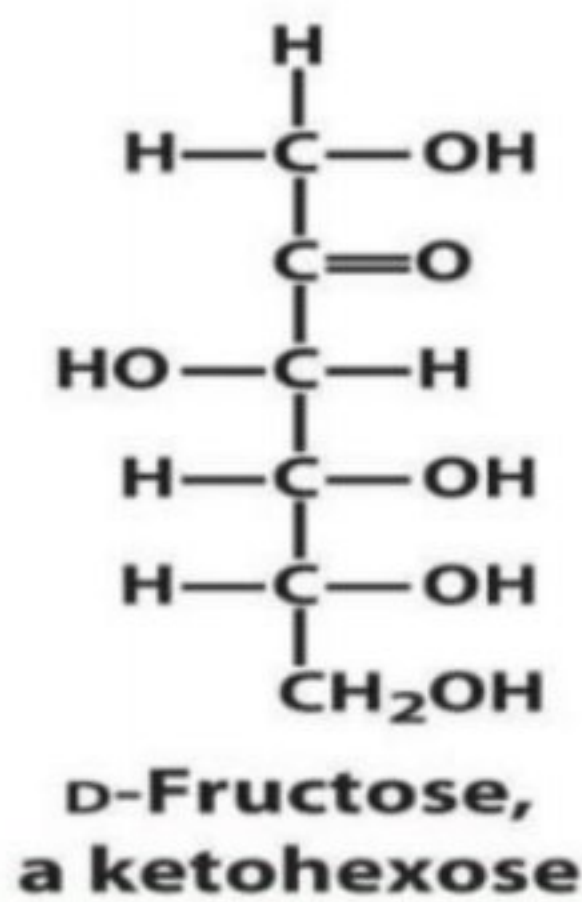
48. Cofactor and coenzymes difference

Coenzymes are small, non-protein organic molecules that carry chemical groups **between** enzymes (e.g. NAD and FAD). Forms easily removed loose bonds. **Cofactor** is a non-protein chemical compound that tightly and loosely binds with an enzyme or other protein molecules

49. Isomer of fructose D

, the naturally occurring form of fructose is the D(–) isomer

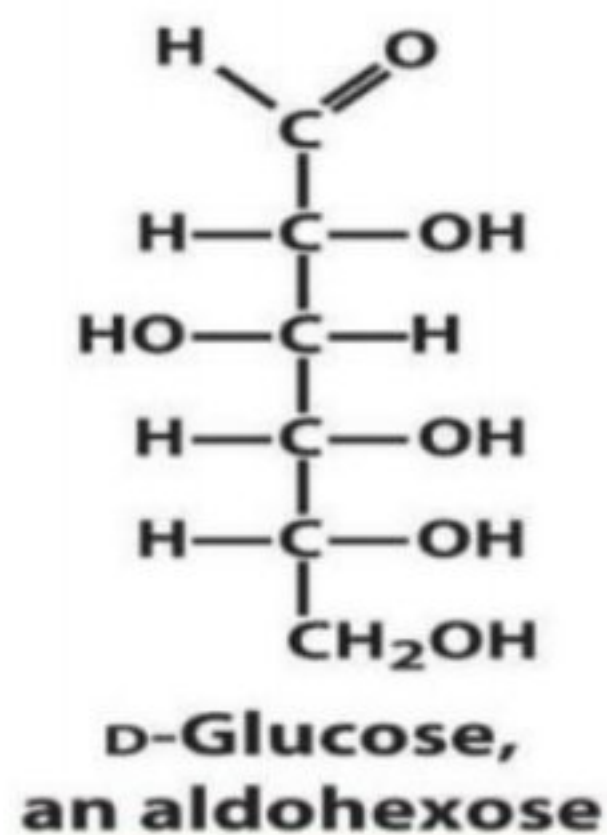
In solution, glucose is dextrorotatory, and glucose solutions are sometimes known as dextrose



50. Interaction of DNA?

Two basic types of chemical **interaction** with **DNA** are noncovalent and covalent binding. ... Covalent **interactions** occur when the chemical, or a portion of the chemical, is covalently adducted to the **DNA** helix. **proteins** organize the **DNA** into a compact structure called chromatin. In eukaryotes, this structure involves **DNA** binding to a complex of small basic **proteins** called histones.

51. D isomer of glucose at C12



52. Sphingomyelin?

- present in the plasma membranes of animal cells and are especially prominent in nerve tissue including myelin, -thus the name "sphingomyelins"
- Sphingomyelin of the myelin sheath contains predominant longer-chain fatty acids such as lignoceric acid and nervonic acid (24 carbon)
- whereas gray matter of the brain has sphingomyelin that contains primarily stearic acid(18 carbon)

53. Hydrophobic and polar head

- **Sphingolipids**, like other membrane lipids, are composed of a
- hydrophobic portion, (ceramide) and
- a polar head group

54. At high altitude PO₂ is lower and oxygen to tissue is reduced?

- At high altitude of hills and mountains, where the pO₂ is considerably lower (due to low atmospheric pressure).
- The delivery of oxygen to the tissues is now reduced.
- However, after just a few hours at the higher altitude, the BPG concentration in the blood begins to rise, leading to a decrease in the affinity of hemoglobin for oxygen.
- This adjustment in the BPG level has only a small effect on the binding of oxygen in

the lungs

- But a considerable effect on the release of oxygen in the tissues shown by increased oxygen unloading at the peripheral tissues.

Increase in BPG concentration in the RBC shifts the dissociation curve to the right, i.e. increased O₂ unloading.

BPG concentration also increases in those conditions in which there is decreased O₂ delivery to tissues, such as in anemia and respiratory diseases.

- As a result, the delivery of oxygen to the tissues is restored to nearly 40% of the oxygen that can be transported by the blood.

55. Enzyme is charted through rate of reaction

Relationship of velocity to enzyme concentration

- The rate of the reaction is directly proportional to the enzyme concentration.
- There is a linear relationship between reaction rate and enzyme concentration (at constant substrate concentration)

56. Phosphodiester bond? (2)

Phosphodiester Bond

- When two or more nucleotides combine together a phosphodiester bond is formed.
- This bond is formed mainly between the 3'OH group of sugar of one nucleotide and 5'PO₄ group of sugar of another nucleotide creating a phosphodiester linkage.

57. Acrolein test of glycerol?

- On heating with sulfuric acid or KHSO₄ (dehydration)
- it gives acrolein that has a bad odor.
- used for detection of free glycerol or any compound containing glycerol.
- In contrast to glycerol
- Sphingosine does not show positive acrolein test.
- Therefore glycerolipids and sphingolipids can be differentiated on the basis of acrolein test.

58. Bile salt?

- bile salts (conjugated bile acids) are quantitatively the most important organic components of bile
- The primary bile acids are synthesized in the liver from cholesterol
- These are cholic acid and chenodeoxycholic acid

Functions of bile salt

- The emulsification of dietary fats in intestinal canal, brought about by bile salts, is a prerequisite for digestion and absorption of fats.
- The bile salts, act to break apart the fat globules in the small intestines and allow them to become more "soluble" for absorption.

59. Activation energy relation to reaction?

The rate of a reaction reflects this activation energy: a higher activation energy

corresponds to a slower reaction.

- Reaction rates can be increased by raising the temperature, thereby increasing the number of molecules with sufficient energy to overcome the energy barrier.
- Alternatively, the activation energy can be lowered by adding a catalyst.
- Catalysts enhance reaction rates by lowering activation energies.
- The activation energy is lower when the enzyme catalyzes the reaction.
- The role of enzymes is to accelerate the inter-conversion of S and P.
- i.e enzymes lower the energy of activation, ΔG^\ddagger , of a reaction.

60. Heterogeneous mRNA

Messenger RNA (mRNA)

- This class is the most heterogeneous in
- Abundance • Size (500-6000 nucleotides)
- base sequence
- Stability
- mRNA comprise about 2–5% of total cellular RNA
- mRNA molecules are formed with the help of DNA template strand (3'-5') during the process called transcription.
- In addition to the protein coding regions in the mature eukaryotic mRNA that can be translated,
- there are untranslated regions at its 5' and 3' ends
- Moreover, there is a 5' cap and
- a poly A tail at 3' end

61. Sphingolipids?

Sphingosine is an amino alcohol,

- which is a component of the class of lipids known as sphingolipids • Sphingosine is synthesized in the body in the form of ceramide,
- to which different moieties are added to form sphingolipids.

62. Histone and its classes?

- Eukaryotic DNA is associated with tightly bound basic proteins, called histones.
- These serve to order the DNA into fundamental structural units, called nucleosomes.
- There are five classes of histones, designated H1, H2A, H2B, H3, and H4.
- These are positively charged at physiologic pH as a result of their high content of lysine and arginine.
- Two molecules each of H2A, H2B, H3, and H4 form the structural core of the nucleosome.
- Around this core, a segment of the DNA double helix is wound nearly twice approximately 140bp

63. Calculate ratio of concentration of acetate and acetic acid if pH = 5.40 and pKa is 4.45?

- $\text{pH} = \text{pKa} + \log \frac{[\text{acetate}]}{[\text{acetic acid}]}$
 $\log \frac{[\text{acetate}]}{[\text{acetic acid}]} = \text{pH} - \text{pKa}$
 $= 5.30 - 4.76$
 $= 0.54$
- $\frac{[\text{acetate}]}{[\text{acetic acid}]} = \text{antilog } 0.54$
 $= 3.5$

- In summary,
- when $[HA] = [A^-]$; $pH=pK_a$
- when $[HA] > [A^-]$; $pH<pK_a$
- when $[HA] < [A^-]$; $pH>pK_a$

64. Three nucleotides?

Nucleotides are composed of three subunit molecules: a nucleobase, a five-carbon sugar (ribose or deoxyribose), and a phosphate group consisting of one to three phosphates. three nucleotides—called a triplet or codon—codes for one particular amino acid in the protein. The nucleotide sequence in the DNA is first transcribed into a molecule of messenger RNA (ribonucleic acid).

65. properties of tags?

Glycerol is widely used in pharmaceutical and cosmetic preparations.

Physical properties • Neutral fats are 1. colourless, 2. odorless and 3. tasteless substances

Physical properties

- Neutral fats are
- colourless, odorless and tasteless substances • Solubility:
- They are insoluble in water but soluble in organic fat solvents(e.g., ether, benzene, acetone, chloroform)
- 5. Specific gravity:
- The specific gravity of all fats is less than 1.0, consequently all fats float in water
- 6. Emulsification:
- Emulsions of fat may be made by shaking vigorously in water and by emulsifying agents such as gums and soaps
-
- The emulsification of dietary fats in intestinal canal, brought about by bile salts, is a prerequisite for digestion and absorption of fats.
- The bile salts, act to break apart the fat globules in the small intestines and allow them to become more "soluble" for absorption.
- The hydrophobic fat molecules will clump together into globules in the watery mixture in the digestive system.
- The emulsifiers break them down to smaller "globules" and allow them to become more soluble.

66. What are lyases?

an enzyme which catalyses the joining of specified molecules or groups by a double bond.

67. Define saponification?

Saponification

- Hydrolysis of a fat by an alkali is called saponification
- The resultant products are;
- glycerol and
- the alkali salts of the fatty acids, which are called “soaps”
-

- The number of mgs of NaOH/KOH required to saponify the free and combined FA in one gram of a given fat is called its **saponification number**

68. Name the inorganic elements serve as cofactor?

metal ion such as Zn^{2+} or Fe^{2+} ,

69. Which amino acid form disulphide bridge?

- The amino acid cysteine in a protein can form a covalent disulfide bond with another cysteine molecule through spontaneous (nonenzymatic) oxidation of their sulfhydryl groups.

70. Detail note on ligands? (10)long question lazmi yaad kryy..

Ligand

In biochemistry and pharmacology, a ligand (from the Latin ligandum, binding) is a substance (usually a small molecule),

- that forms a complex with a biomolecule to serve a biological purpose.
- In a narrower sense, it is a signal triggering molecule, binding to a site on a target protein
- A molecule bound reversibly by a protein is called a ligand.
- Ligands include substrates, inhibitors, activators, and neurotransmitters
- A ligand may be any kind of molecule, including another protein.
- A ligand binds at a site on the protein called the binding site, binding site is complementary to the ligand in size, shape, charge, and hydrophobic or hydrophilic character.
- Furthermore, the interaction is specific: the protein can discriminate among the thousands of different molecules in its environment and selectively bind only one or a few.
- The binding of a protein and ligand is often coupled to a conformational change in the protein that makes the binding site more complementary to the ligand, permitting tighter binding **called induced fit**.
- A given protein may have separate binding sites for several different ligands.
- In a multi-subunit protein, a conformational change in one subunit often affects the conformation of other subunits.
- Interactions between ligands and proteins may be regulated, through interactions with additional ligands.
- These other ligands may cause conformational changes in the protein that affect the binding of the first ligand.

71. Enzymes and the classification of enzymes? (10)long question lazmi yaad kry repeated he.

IUB Classification of Enzymes

- International Union of Biochemists (IUB) developed an unambiguous system of enzyme nomenclature in which each enzyme has a
- unique name and
- code number
- As an example, the formal systematic name of the enzyme (hexokinase) catalyzing the reaction

- $\text{ATP} + \text{D-glucose} \rightarrow \text{ADP} + \text{D-glucose-6 phosphate}$ is
- ATP:glucose phosphotransferase,
- Its Enzyme Commission (E.C.) number is 2.7.1.1.
- (2) denotes the class name (transferase)
- (7) the subclass phosphotransferase
- (1) denotes a hydroxyl group as acceptor
- (1) D-glucose as the phosphoryl group acceptor.
- In the systematic naming system, enzymes are divided into six major classes each with numerous subgroups

CLASSIFICATION OF ENZYMES		
Group of Enzyme	Reaction Catalysed	Examples
1. Oxidoreductases	Transfer of hydrogen and oxygen atoms or electrons from one substrate to another.	Dehydrogenases Oxidases
2. Transferases	Transfer of a specific group (a phosphate or methyl etc.) from one substrate to another.	Transaminase Kinases
3. Hydrolases	Hydrolysis of a substrate.	Estrases Digestive enzymes
4. Isomerases	Change of the molecular form of the substrate.	Phospho hexo isomerase, Fumarase
5. Lyases	Nonhydrolytic removal of a group or addition of a group to a substrate.	Decarboxylases Aldolases
6. Ligases (Synthetases)	Joining of two molecules by the formation of new bonds.	Citric acid synthetase

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1) Oxidoreductases

- catalyze oxidation reduction reactions
- further divided into four subgroups;
- Oxidase,
- Dehydrogenases, • Hydroperoxidases
- Oxygenases.

2) Transferases

- These bring about a transfer of functional groups such as
- phosphate and
- amino group
- from one molecule to another molecule called donor and acceptor molecules respectively.
- The common examples of this group are
- Transminases
- Phosphotransfrases (Kinases)
- Hexokinase is a phosphotransfease which catalyze the transfer of phosphate groups.
- $\text{Glucose} + \text{ATP} \rightarrow \text{Glucose 6-phosphate} + \text{ADP}$.

3) Hydrolases

- These enzymes catalyze hydrolysis, i.e.
- add water molecule to the substrate which is simultaneously decomposed; the functional group of substrate is transferred to water.
- Common example of hydrolases are:
- Protein hydrolyzing Enzymes (peptidases).
- Carbohydases
- Lipid hydrolyzing enzymes e.g. Lipases and

4) Lyases

- These enzymes catalyze the addition of
- NH_3 ,
- H_2O or
- CO_2 to double bonds or
- the removal of these groups leaving behind double bonds.
- Lyases are included in a separate class because they catalyze these reactions by means other than hydrolysis or oxidation.

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5) Isomerases

These enzymes catalyze the structural change within a single molecule by the transfer of groups within it, resulting in the formation of an isomeric form of substrate.

6) Ligases

- These enzymes catalyze condensation reactions joining two molecules by forming
- C-O,
- C-S,
- C-N and
- C-C bonds.
- The energy for condensation is provided by cleavage of high energy phosphates, e.g. ATP, GTP etc.

72. Large and small non-coding RNA (10) long question repeated ...

- **Large & Small Noncoding Regulatory RNAs**
- One of the most exciting discoveries in the last decade of eukaryotic regulatory biology has been the identification and characterization of regulatory nonprotein coding RNAs (ncRNAs).
- ncRNAs exist in two general size classes,
- small consisting of microRNA (miRNAs) and silencing (siRNAs) and
- Large consisting of long noncoding RNAs (lncRNAs)
- The small ncRNAs termed microRNA (miRNAs) and silencing (siRNAs) typically inhibit gene expression at the level of specific protein production by
- targeting mRNAs through one of several distinct mechanisms.
- Both siRNAs and miRNAs typically hybridize, via the formation of RNA–RNA hybridization to their targeted mRNAs
- **long noncoding RNAs (lncRNAs).**
- lncRNAs, which as their name implies, do not code for protein (ie, the mRNA encoding

genes).

- ncRNAs make up a significant portion of eukaryotic transcription
- ncRNAs play many roles ranging from contributing to structural aspects of chromatin to regulation of mRNA gene transcription by RNA polymerase II.

Sir Arslan