BIO-202 Biochemistry current file

LION GROUP OF ZOOLOGIST

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Q.1 What is Bohr effect?

Bohr effect is a phenomenon first described in 1904 by the Danish physiologist Christian Bohr. Hemoglobin's oxygen binding affinity is inversely related both to acidity and to the concentration of carbon dioxide. it also means the reciprocal coupling of proton and oxygen binding termed as Bohr effect.

Q.2 Binding of oxygen with hemoglobin at sea level as well as at high altitude?

The amount of hemoglobin in blood increases at high altitude. This is one of the best-known features for hemoglobin. Increasing the amount of hemoglobin in the blood increases the amount of oxygen that can be carried. so, at high altitudes the atmospheric pressure as well as the partial pressure of oxygen is lower than that at the ground level. This leads to low concentration of the oxygen in the blood. For this reason, binding affinity decreases.

Q.3 What information is observed from titration curve of glycine?

The titration curve of Glycine has two regions of buffering power. At pKa 2.34, glycine is a good buffer near this Ph. The other buffering zone is centered on a pH of 9.60. Glycine is not a good buffer at the pH of intracellular fluid (or) blood, about 7.4.

Q.4 Differentiate between enantiomer and diastereomer?

Enantiomers are the chiral molecules that are mirror images of one another and are not superimposable. Diastereomers are the stereomer compounds with molecules that are not mirrored images of one another and that are not superimposable

Q.5What are alpha beta and gamma carbon?

The alpha carbon in organic molecules refers to the first carbon atom that attaches to a functional group, such as a carbonyl. The second carbon atom is called the beta carbon and the carbon present next to the beta carbon is the gamma carbon.

Q.6 How A and B antigen differ from O antigen?

Blood group A – has A antigens on the red blood cells with anti-B antibodies in the plasma. blood group B – has B antigens with anti-A antibodies in the plasma. ... blood group AB – has both A and B antigen and have no antibodies A and B. Blood group O has no antigens, but they contain both anti-A and anti-B antibodies in the plasma.

Q.7 What is the structure of amino acid?

Each amino acid has the same fundamental structure, which consists of a central carbon atom, also known as the alpha (α) carbon, bonded to an amino group (NH2), a carboxyl group (COOH), and to a hydrogen atom. ... Every amino acid also has another atom or group of atoms bonded to the central atom known as the R group.

Q.8 heme interaction.

Heme synthesis starts in mitochondria with the condensation of succinyl-CoA with the amino acid glycine, activated by pyridoxal phosphate. ALA synthase is the rate-limiting enzyme of heme synthesis. Haem-haem interaction consists of a change of tension at the haems, caused by a transition between two alternative quaternary structures of the protein. Dr Perutz describes how spin changes that accompany reaction with ligands alter the oxygen affinity of the haems.the cooperative interaction between dioxygen binding sites that occurs when dioxygen binds to hemoglobin; as oxygenation proceeds, the combination of additional dioxygen molecules is made easier.

Q.9 Selenocysteine:

the 21st amino acid, exists naturally in all kingdoms of life as the defining entity of seleno proteins.

Functions: Selenocysteine is an analogue of cysteine (Figure 3.5). In place of a sulfur atom in the cysteine, selenocysteine contains selenium (Se). Several human proteins and enzymes are selenoproteins. Selenocysteine is located in the active sites of enzymes that participate in oxidation–reduction reactions.

Q.10 What is fibrinogen?

Fibrinogen is a glycoprotein complex, made in the liver, that circulates in the blood of all vertebrates. During tissue and vascular injury, it is converted enzymatically by thrombin to fibrin and then to a fibrin-based blood clot. Fibrin clots function primarily to occlude blood vessels to stop bleeding.

Q.11 What is the function of sorbitol?

Sorbitol is a sugar alcohol found in fruits and plants with diuretic, laxative and cathartic property. Unabsorbed sorbitol retains water in the large intestine through osmotic pressure thereby stimulating peristalsis of the intestine and exerting its diuretic, laxative and cathartic effect.

Sorbitol is also used as sweetener.

Q.12 What is the sucrase location and function?

The sucrase-isomaltose enzyme is found on the surface of the intestinal epithelial cells, which are cells that line the walls of the intestine. These cells have fingerlike projections called microvilli that absorb nutrients from food as it passes through the intestine

Q.13 Amino acids negatively charged (Acidic) R group. These amino acids are proton donor. At neutral PH. These amino acids are fully ionized, containing a negatively charged carboxylate group. Therefore this amino acid are negatively charged at physiological PH.

Q.14 Domain in tertiary structure.

The tertiary structure of large complex protein is often described in term of physically independent region called structural domain. A domain is a section of protein structure sufficient to perform a particular chemical or physical task such as binding of substrate or another ligand.

Q.15 Hydrophobic interaction.

Hydrophobic interaction occurs between non polar uncharged side chains such as between aromatic groups of phenylalanine side chain

Q.16 Function of Amylase and Maltase

Amylase digest starch into smaller molecule yielding maltose, which in turn cleaved into two glucose molecules by maltase.

Q.17 One letter Representation for Glutamate and Glutamine

Glutamate glu E

Glutamine Gin Q

Q.18 Functions of Lipids in our body

In our body, lipid function as energy reserve, regulate hormone, transmit nerve impulses, and transmit fat soluble nutrients.

Q.19 Beta conformation of proteins

The beta conformation organizes polypeptide chain in beta sheets. Beta sheets are second type of regular secondary structure that maximize hydrogen bonding between the peptide backbone.

Q.20 Side chain properties of Serine and Threonine

Serine and threonine are aliphatic, polar, uncharged groups. The R group of these amino acid are more soluble in water or more hydrophilic than those of nonpolar amino acid because they contain functional groups that form hydrogen bond with water.

Q.21 Alanine briefly explain and calculate its PI

Alanine contains both an alpha carboxyl and an alpha amino acid group .at low ph both of these groups are protonated as the ph. of solution raised the COOH group of form I can dissociate by donating a proton to the medium the release of proton result in the formation of carboxylate group COO- it is a dipolar molecule this is isoelectric point of alanine

Q.22 Difference between L fucose and L ramose.

L fucose is found in the complex oligosaccharide component of glycoprotein and glycolipid rhamnose is found in plant poly saccharide

Q.23 Write rules of giving first letter name to amino acids.

If only one amino acid begins with particular letter, then that letter is used as its symbol example isoleucine =I

If more then one amino acid begins with particular letter, the most common of theses receives this letter as its symbols for example glycine is more common then glutamate so glycine =G

For the remaining amino acid, as one letter symbol is assigned that is as close in the alphabet as possible to the initial of amino acid

Q.24 Explain amyloidosis

Amyloidosis is a generic term that refers to the extracellular tissue deposition of low molecular weight of a variety of protein misfolded.

Q.25 Five examples of biomedical importance of protein.

Heme containing protein are involved in the function of respiration e.g., hemoglobin

Digestive protein digest food our food material such as carbohydrate, protein, lipid include amylase pepsin lipases

Protein transport various substance from one part of the body to other.

Fibrinogen forms fibrin clot and stop bleeding from clot.

Essential component protoplasm.

Q.26 Ketogenic amino acids

Amino acid whose catabolism yields either acetoacetate or its precursor are termed as ketogenic. leucine and lysine are its example.

Q.27 Mutarotation

Mutarotation is the change in optical rotation because of change in the equilibrium between two anomers.

Q.28 Isoelectric point

The isoelectric point is the Ph at which a particular molecule carries no electrical charge

Q.29 Complex lipids and its three types

Ester of fatty acid containing groups in addition to an alcohol and fatty acid. These include phospholipids, glycolipid

Q.30 What is native protein?

Protein which are in their folded and assembled form and are fully functional. they are unaltered by denaturing agents such as heat, chemical, enzyme action or other exogenesis of extraction.

Q.31 What is amylase

Amylase is digestive enzyme secreted by pancreas and salivary gland.

Q.32 Calculate PI of histidine?

PI=PK1+PK2/2

PK1=2.3(for carboxyl group)

PK2=9.1(for amino group)

PI=2.3+9.1/2=5.7

Q.33 Define buffer?

Buffer is a substance that resist change in Ph when a small amount of acid is base is added to it.

Q.34 Properties of lipids?

Lipids may be either liquid or non- crystalline solid at room temperature

Pure fats and oils are colorless, odorless, and tasteless

They are insoluble in water, soluble in organic solvent

They are energy rich organic molecule

Q.35 Formation of 2-deoxy-D-ribose from the D-ribose?

When oxygen of a OH group is removed in a monosaccharide then de-oxy sugars are formed .2 deoxy D-ribose is derived from D-Ribose and important constituent of DNA.

Q.36 Enlist essential amino acids name?

Histidine, Isoleucine, Leucine Methionine, Threonine, Valine, lysine

Q.37Describe the beta confirmation of protein?

The beta sheet also called as beta pleated sheet is a common motif of the regular protein secondary structure. A beta strand is a stretch of poly peptide chain typically 3 to 10 amino acid long with backbone in an extended conformation.

Q.38 How light produced fireflies

The light produced by fireflies is the result of reaction involving the protein luciferin and Atp, calyzed by enzyme luciferase.

Q.39 glycosidic bond is formed

Glycosidic bond is formed by the condensation of alcohol or amine of one molecule and anomeric carbon of the sugar of other.

Q.40 Contractile and transport proteins

Contractile protein are involved in muscle contraction and relaxation. Myosin of thick filaments.

Transport protein transport various substances from one part of the body to other e.g. hemoglobin transport oxygen from lungs to tissue and carbon dioxide from tissue to lungs.

Q.41 Abbreviation and symbol of methionine alanine arginine.

Methionine = Met =M

Arginine =Arg =R

Q.42 Name two proteins that contain selenocysteine? write their function of selenocysteine.

Serine and pyrrolysine are selenocysteine protein, selenocysteine is an L -alpha amino acid including certain peroxidase and reductase where it participates in the catalysis f electron transfer reaction.

Q.43 What are carbohydrates. List 4 major groups.

Carbohydrate are polyhydroxy aldehyde or ketone, or substances that yield such compound on hydrolysis.

Monosaccharide, disaccharides, oligosaccharides, polysaccharide

Q.44 What are motifs in protein.

A motif is also called as super secondary structure is simply a recognizable folding pattern involving two or more element f secondary structure and the connection between them.

Q.45 Function of amide group in asparagine?

Asparagine is the amide of aspartic acid .it has high propensity to hydrogen bond, since the amide group can accept two and donate two hydrogen bond.

Q.46 D and L isomerism

The designation of sugar isomer as the D form or as L form is determined by its spatial relationship to the parent compound of carbohydrate ,the glyceraldehyde .The orientation of the -H and-OH groups around the carbon atom adjacent to the

terminal primary alcohol or carbon most distant from the carbonyl carbon the penultimate carbon .Carbon 5 in glucose determine whether the sugar belongs to D or L series when the OH group in this carbon is on the right the sugar is D isomer when it is on the left it is L isomer

Q.47 Octet rule problem

Octet rule can not be used for type II cation .the physiological oxidation state of an iron atom has two positive charge instead of three charge ,and its too large to fit into the plane of protoplasm however ,when iron is oxidized from ferrous ion to ferric ion there is loss of one extra electron ,forces between electron and proton decrease so that electron cloud penetrate more toward the nucleus as a result the ferric ion has smaller size then ferrous ion and fit into the protoporphyrin plane.

Q.48 Beta conformation of proteins

A stable conformation of polypeptide chain in which the chain is almost fully extended, but slightly puckered.

Q.49 Side chain properties of Serine and Threonine

Serine and threonine possess hydroxyl groups in their side chain as these are polar groups are close to the main chain, they can form hydrogen bonds with it

Q.50 properties of non-polar aliphatic R groups.

These are hydrophobic. these amino acids contain non polar side chain that do not bind, or give off proton. They are oily

lipid like and promote hydrophobic interaction. These side chain cluster together in the interior of protein. This class include glycine, alanine, proline, valine leucine.

Q.51 effects of allosteric on hemoglobin.

Ability of hemoglobin to reversibly bind to oxygen is affected by

Ph of the environment, the pco2 and the availability of 2,3 -bis phosphor glycerate these are collectively called as allosteric effectors, because their interaction at one site on the hemoglobin molecule effect the binding of oxygen to heme group at other location on the molecule.

Q.52 what is protein folding.

It is the physical process by which a polypeptide fold into its characteristic and functional three-dimensional structure from random coil

Q.53 What is the monosaccharide equation reaction

Monosaccharide is simple sugar and are not hydrolyzed further into simpler forms. They are unbranched and are in open chain form. examples are glucose, fructose, ribose