

VU Medical Zone

BIO 202 Final terms Subjective

Effort By Amaan Khan

1) Name two second messenger of nucleotides? (2marks)

1. Cyclic AMP (cAMP)
2. Cyclic GMP (cGMP)

2) What are simple lipids? Give two types of simple lipids. (2 marks)

Esters of fatty acids with various alcohols. There are two types of simple lipids Fats and waxes.

3) Define buffer? Write its composition. (2 marks)

A buffer is a solution that resists change in pH following the addition of an acid or base.

Histidine has got 3 dissociable hydrogens – one from carboxyl, $pK_1=1.8$, – one from imidazole group, $pK_2=6.0$ – one from amino group, $pK_3=9.2$.

4) Define saponification Number? (3marks)

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.

5) Define enzyme kinetics? (3 marks)

The oldest approach to understanding enzyme mechanisms that remains the most important, is to determine the rate of the reaction and how it changes in response to changes in experimental parameters, a discipline known as enzyme kinetics.

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6) Medical applications of Nucleotides and nucleic acid. (3 marks)

Medical applications specifically medical applications include the:

Use of synthetic purine and pyrimidine analogs that contain halogens, thiols, or additional nitrogen atoms:

There use includes chemotherapy for cancer.

As suppressors of the immune response during organ transplantation.

As anti-viral drugs such as in the treatment of AIDS.

7) Properties of waxes (5 marks)

Properties of waxes:

Waxes are insoluble in water, but soluble in fat solvents and are negative for acrolein test and very resistant to rancidity.

8) Nucleotides as 'energy currency' of the cell? (5 marks)

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.

9) Classification of enzymes? (5 marks)

Oxidoreductases: Transfer of electrons (hydride ions or H atoms).

Transferases: Group transfer reactions.

Hydrolases: Hydrolysis reactions (transfer of functional groups to water).

Lyases: Addition of groups to double bonds, or formation of double bonds by removal of groups.

Isomerases: Transfer of groups within molecules to yield isomeric forms.

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Ligases: Formation of COC, COS, COO, and CON bonds by condensation reactions coupled to ATP cleavage.

10) Define enzymes? Write classification of enzymes? (10 marks)

A substance produced by a living organism which acts as a catalyst to bring about a specific biochemical reaction.

Oxidoreductases: Transfer of electrons (hydride ions or H atoms).

Transferases: Group transfer reactions.

Hydrolases: Hydrolysis reactions (transfer of functional groups to water).

Lyases: Addition of groups to double bonds, or formation of double bonds by removal of groups.

Isomerases: Transfer of groups within molecules to yield isomeric forms.

Ligases: Formation of COC, COS, COO, and CON bonds by condensation reactions coupled to ATP cleavage.

11) Difference between nucleoside and nucleotide. 2

The addition of a pentose sugar to a base produces a nucleoside.

Nucleotides are monophosphate, diphosphate, or triphosphate esters of nucleosides.

12) What are lipoproteins? 2

Combinations of lipid and protein (lipoproteins) serve as the means of transporting lipids in the blood.

13) Enzyme kinetics 2

The oldest approach to understanding enzyme mechanisms that remains the most important, is to determine the rate of the reaction and how it changes in response to changes in experimental parameters, a discipline known as enzyme kinetics.

14) Components of nucleotide. 3

A phosphate group

Nitrogenous base

Pentose sugar

15) What are sterols? 3

Steroids with eight to ten carbon atoms in the side chain at C17 and a hydroxyl group at C-3 are classified as sterols. Phospholipids and sterols are major structural elements of biological membranes.

17) Five functions of cyclic AMP. 5

Functions of c-AMP:

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.

18) Characteristics of VLDL. 5

VLDLs are assembled in the liver.

It is composed predominantly of TAGs synthesized in liver.

It contains some cholesterol and cholesteryl esters.

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19) Bees wax and spermaceti. 3 marks

Bees-wax is secreted by the honeybees that use it to form the combs. It is a mixture of waxes. Its chief constituent is myricyl palmitate (30C) (16C).

Spermaceti is a wax that is most often found in the head cavities of the sperm whale. Fatty esters are formed essentially of cetyl palmitate and cetyl myristate.

20) Halogenation with respect to fat. 5 marks

Halogenation is similar to hydrogenation. Halogens such as chlorine, bromine and iodine can also be added to double bonds in unsaturated fatty acids. Degree of halogenation is a good index of degree of unsaturation of Fatty Acids. The number of grams of iodine which will be absorbed by 100 grams of a fat is termed its iodine number.

21) Define function of lipoxin. 2 marks

Lipoxins induce chemotaxis and stimulate superoxide radicals for killing of microorganisms.

22) Define glycerol. 3 marks

Glycerol:

It is a simple poly hydroxy alcohol (also called polyol or sugar alcohol and part of a class of lipids: glycolipids). It contains 3 carbons and 3 hydroxyl (OH) groups. Glycerol is synthesized from Dihydroxyacetone Phosphate (an intermediate of the glycolytic pathway). Glycerol is a precursor for synthesis of triacylglycerols and of phospholipids in the liver and adipose tissue.

23) Properties of glycerol trinitrate?

Glycerol combines with three molecules of nitric acid to form Glycerol trinitrate:

That is used as explosive

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Vasodilator.

24) Nucleotide serves as single transduction pathway. 3 marks

Nucleotides, such as cyclic AMP (cAMP) and cyclic GMP (cGMP), serve as second messengers in signal transduction pathways.

Signal Transduction: GTP and GDP play key roles in activating or inhibiting proteins in various cellular signaling cascades.

25) Example of condensation reaction. 2 marks

N-glycosidic bond

O-glycosidic bond

26) Note on nitrogenous bases. 5 marks

The nitrogen containing bases belong to two families of compounds:

- Purines
- Pyrimidines

By the attachment of different groups to the rings, different types of pyrimidine and purine are generated. The utility of these nitrogen-containing ring structures lies in the ability of the nitrogen to form hydrogen bonds and to accept and donate electrons while still part of the ring.

27) Iodine number. 2 marks

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

28) Explain numbering of carbon atoms in nitrogenous bases. 2 marks

Numbering of Carbon and Nitrogen Atoms

The carbon and nitrogen atoms in the rings of the base and the sugar are numbered separately.

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The atoms in the rings of the bases are numbered:

1 to 6 in pyrimidines & 1 to 9 in purines.

29) Name of Three pyrimidine bases. 3 marks.

1. Cytosine
2. Thymine
3. Uracil

30) What is Rancidity? Name and factors. 5 marks

It is a physicochemical change in the natural properties of the fat leading to the development of unpleasant odor or taste or abnormal color

On aging after exposure to atmospheric oxygen, light, moisture, bacterial or fungal contamination and or heat.

31) What are waxes? Write detail Classification with examples. 10 marks

A second group of neutral lipids that are of physiological importance. Although they are a minor component of biological systems.

Properties of waxes:

Waxes are insoluble in water, but soluble in fat solvents and are negative for acrolein test and very resistant to rancidity.

Waxes are of two types: True waxes and Other Waxes or Non true waxes or Wax-like compounds.

True Waxes: Waxes are solid simple lipids containing a monohydric alcohol (with a higher molecular weight than glycerol) esterified to long chain fatty acids.

1. True Waxes: Bees-wax is secreted by the honeybees that use it to form the combs. It is a mixture of waxes. Its chief constituent is myricyl palmitate (30C) (16C).
2. Spermaceti: is a wax that is most often found in the head cavities of the sperm whale. Fatty esters are formed essentially of cetyl palmitate and cetyl myristate.
2. Other Waxes or Non true waxes include esters of: Cholesterol, Vitamin A, and Vitamin D.

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32) Primary structure of DNA? 5marks

DNA Primary Structure: 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, unbranched chain is formed.

The resulting long, unbranched 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 form a variable part. The variable part is concerned with the expression of genetic information.

33) Where is Keratin present? 2 marks

Hoof, hair and nails.

34) Palmitic acid main carbons. 2 marks

16

35) Types of Polysaccharide. 2 marks

Homopolysaccharides(homoglycans): Polymers of same monosaccharide units e.g. starch, glycogen, inulin, cellulose, dextrans, dextrans.

Heteropolysaccharides(heteroglycans): Polymer of different monosaccharide units or their derivatives e.g. Mucopolysaccharides (glycosaminoglycans).