**Name:** Haseena Kausar

**Student ID:** 16468

**Instructor:** Mam Sana

**Department:** AHS micro 2nd

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**QUESTION NO 1**

**Define enzyme inhibition? Enlist the factors that effect the activity of enzymes.**

**ANSWER:**

**ENZYME INHIBITION:**

**Definition:**

There are some compounds that combine with enzyme and decrease the activity of enzyme that diminish the rate of reaction such substances are called enzyme inhibitors and the phenomenon is known as enzyme inhibition.

**Example:**

Cyanides

H2S

Certain drugs which poisonous and prevent ezyme action and cause death.

**TYPES OF ENZYME INHIBITORS:**

1. Competitive inhibition
2. Non-competitive inhibition

**IMPORTANCE OF ENZYME INHIBITION:**

* For understanding the regulation of enzyme activity within the living cells.
* Useful in elucidating the cellular metabolic pathways by causing accumulation of intermediates.
* Identification of the catalytic / functional groups at the active site of enzyme.
* Provide information about substrate specificity of the enzyme.
* Useful to study the mechanism of catalytic activity.
* Enzyme inhibitors have therapeutic applications – some drugs are useful in medicine appear to function by inhibiting certain E.
* Most drugs are Competitive.

**FACTORS AFFECT THE ACTIVITY OF ENZYME:**

Factors which affect the activity of enzyme are:

1. Enzyme concentration
2. Substrate concentration
3. Effect of temperature
4. Effect of pH
5. Effect of activator
6. Effect of inhibitor
7. **ENZYME CONCENTRATION:**

* The rate of enzymatic reaction is directly proportional to enzyme concentration.
* Greater thee amount of enzyme, greater will be the rate of enzymatic reaction.
* A straight line is obtained while plotting graph between enzyme concentration and enzyme activity.

1. **SUBSTRATE CONCENTRATION:**

* The rate of enzyme reaction is directly proportional to the substrate concentration.
* Greater the amount of substrate, greater will be the rate of enzymatic reaction.

**OR**

* By increasing the concentration of substrate, the rate of reaction also increases.
* Then a time will come when further increase in concentration of substrate will cause no effect on the rate of reaction.
* This is because all the active sites of enzymes molecule present become saturated by substrate molecule.
* When the concentration of substrate is low, then the active site of enzyme molecule present may not be occupied by substrate and thus enzyme will perform NO activity.

1. **EFFECT OF TEMPERATURE:**

* Enzymes are sensitive to heat.
* They lose their activity at high temperature i-e. At high temperature the enzymes become denature.
* The temperature at which enzymes work best is called its Optimum temperature (37°C in human).
* By increasing or decreasing temperature from Optimum temperature, will effect the enzymatic activity.

1. **EFFECT OF PH:**

* Each enzyme has an optimum PH at which it shows the maximum activity.
* Change in PH cause the lose of enzymatic activity.
* Each enzyme has its own optimum PH at which it works best.

**EXAMPLE:**

1. PH of pepsin is 1.6.
2. PH of trypsin is 8.2.
3. PH of urease is 7.0.
4. **EFFECT OF ACTIVATOR:**

* Activators are the substances which increases the activity of enzyme.

**EXAMPLE:**

1. Phosphate enzyme has Mg+2 as an activator.
2. Carbonic anhydrase enzyme has Zn+2 as an activator
3. **EFFECT OF INHIBITORS:**

* Inhibitors are the substances which decreases the activity of enzymes.

**TYPES:**

**COMPETITIVE INHIBITOR:**

These inhibitors attach at the active site of enzyme and stop its activity.

**NON-COMPETITIVE INHIBITOR:**

These inhibitors attach to the site other than active site of enzyme and effects its activity.

**Reversible Non-competitive inhibitors:**

In this case the inhibitor can be removed from its binding site without loosing of effecting the activity of enzyme.

**Ir-reversible Non-Competitive inhibitors:**

In this case the inhibitors can’t be removed from its binding site. If it can be remove than it will loose the enzymatic activity.

**QUESTION NO 2**

**What are the functions of Saccharide? Also write down its types.**

**ANSWER:**

**SACCHARIDE:**

Saccharide is derived from Greek word “Sakkron” which means “sugar”.

Carbohydrates are most abundant bio-macromolecule on earth. They are commonly known as sugar because most of them have sweet taste.

**FUNCTIONS:**

1. **Source of Energy:**

Carbohydrates act as a primary source of energy.

1. **Sweetness:**

Some sugar are sweet in taste as they provide sweetness of fruits.

1. **Essential Component:**

Carbohydrate or saccharide acts as essential component in genetic material.

E.g. Ribose

**4. Structural frame work:**

Some carbohydrates formed the sturctural frame work of cell.

Peptidoglycane form the cell wall of bacteria cell.

E.g. chitin form the exoskeleton of earthpoles.

**5. Industrial Use:**

Some carbohydrates are used as raw material in many industries.

E.g. cellulose in used in paper industry.

**TYPES:**

Carbohydrates or saccharide are classified into 4 types.

1. Monosaccharide
2. Disaccharide
3. Oligosaccharide
4. Polysaccharide
5. **MONOSACCHARIDE:**

* Monosaccharide is also known as simple sugar.
* The fundamental unit of carbohydrates.
* They cannot be further hydrolysed to yield smallest units.
* Common names of most of the saccharides end with the word “OSE” on the basis of number of carbon atoms.
* Monosaccharides are classified as:

Triose – 3C – Glycolaldehyde

Tetrose – 4C – Erythrose

Pentose – 5C – Ribose

Hexane – 6C – Glucose, fructose

1. **DISACCHARIDE:**

* Disaccharide consist of 2 monosaccharide units.
* Formed through glycoside linkage bond.
* They can be further hydrolysed to yield.
* Examples:

Sacrose: Glucose + Fructose

Lactose: Galactose + Glucose

Maltose: Glucose + Glucose

1. **OLIGOSACCHARIDE:**

* Oligo means “few” and saccharide means “sugar”.
* Oligosaccharide consist of 3 monosaccharide unit.
* They are also formed through Glyosidic bond.
* They can be further hydrolysed to yield its monomers.
* Examples:

Raffinose: 1Galactose + 1Glucose + 1Fructose

Stachyose: 2Galactose + 1Glucose + 1Fructose

1. **POLYSACCHARIDE:**

* Poly mean “many” and saccharide means “sugar”.
* Polysaccharide contain more than 10 monosaccharide unit.
* They also hydrolysed to yield monomers.
* Further classified into two types or groups of monosaccharide
  1. Homo-polysaccharide
  2. Hetro-polysaccharide

**HOMOPOLYSACCHARIDE:**

* They are composed of only single type of monosaccharide units.
* Example:

Starch, Gylcogen and Cellulose are polymers of glucose units.

**HETROPOLYSACCARIDE:**

* Composed of more than 1 type of monosaccharide units.
* Example:

Peptidoglycan

Heparin

**QUESTION NO 3**

**Classify the BLOOR classification of lipids?**

**ANSWER:**

**LIPIDS:**

Any of a class of organic compounds that are fatty acids or their derivatives and are insoluble in water but soluble in organic solvents.

They include many natural oils, waxes and steroids.

**CLASSIFICATION OF LIPID BY BLOOR:**

Bloor in 1943 proposed the following classification of lipids based on their chemical composition.

* Simple lipids
* Compound lipids
* Derived lipids
  1. **SIMPLE LIPIDS:**

There are esters of fatty acid with various alcohols.

1. **Fats and oils:**

These are esters of fatty acids with a trihydroxy alcohol, glycerol.

A fat is solid at ordinary room temperature whereas an oil is liquid.

1. **Waxes:**

These are esters of fatty acids with high molecular weight alcohols.

* 1. **COMPOUND LIPIDS:**

These are esters of fatty acids with alcohol and possess additional groups also.

They include:

1. Phospholipids
2. Glycolipids
3. Sulfolipids
4. Lipoproteins

**PHOSPHOLIPIDS:**

* They are phosphate containing lipids.
* They are present in all biological membrane.
* They play important role in electron transport oxidative phosphorylation and transportation of ions across the membranes.

**Two types of phospholipids:**

1. Glycerophospholipids
2. Sphingophospholipids

**GLYCOLIPIDS:**

These are compound lipids which contain carbohydrate in addition to fatty acid and alcohols.

**SULFOLIPIDS:**

These are sulfate containing lipids

**LIPOPROTEINS:**

These lipids contain protein in addition to fatty acid and alcohol.

* 1. **DERIVED LIPIDS:**
* These are substances derived from simple and compound lipids by hydrolysis.
* These include fatty acids, mono and diglycerides, steroids, terpenes and carotenoids.

**QUESTION NO 4**

**Discuss fatty acid and its types with example.**

**ANSWER:**

**FATTY ACID:**

* A carboxylic acid consisting of a hydrocarbon chain and a terminal carboxyl group, especially any of those occurring as ester in fats and oils.
* Fatty acids are the building blocks of the fat in our bodies and in the food we eat.
* During digestion, the body breaks down fats into fatty acids, which can then be absorbed into the blood.
* Fatty acids molecules are usually joined together in groups of three, forming a molecule called a triglyceride.
* Fatty acids are made up of long chains of carbon atoms and hydrogen atoms. Some carbon are linked by single bonds and others by double bonds. These bonds determine which type of fatty acid the molecule is classified as.
* Examples are fats, oils, cholesterols and steroids.
* Fatty acids are in fact carboxylic acids with long aliphatic chain, which can be saturated or unsaturated.
* The general formula for a fatty acid is R-COOH where R represents a long hydrocarbon chain.
* There are two essential fatty acids in human nutrition:
  1. Alpha-linolenic acid (an omega-3 fatty acid)
  2. Linoleic acid (an omega-6 fatty acid)

**CLASSIFICATION:**

Fatty acids are classified into two types

1. Saturated fatty acids
2. Unsaturated fatty acids
3. **SATURATED FATTY ACIDS:**

* The saturated fatty acids are derived from both animal fats and plants oils.
* Saturated fatty acids are straight-chain organic acids with an even number of carbon atoms.
* Saturated fatty acids are important to nutrition because of their ability to elevate blood lipid levels in humans.
* Saturated fatty acids are the fatty acids with the greatest blood lipid elevating effect in humans.
* When a fatty acid is saturated it is an indication that there are no carbon-carbon double bonds.
* The saturated fatty acids have higher making points than unsaturated acids of corresponding size due to their ability to pack their molecules together thus leading to a straight rod-like shape.

**EXAMPLES:**

1. Lauric
2. Myristic
3. Palmitic
4. Stearic
5. **UNSATURATED FATTY ACIDS:**

* Unsaturated fat is a fat or fatty acid in which there is at least one double bond within the fatty acid chain.
* Most naturally occurring fatty acids contain an even number of carbon atoms and are unbranched.
* A fatty acid chain is monounsaturated if it contains one double bond, and polyunsaturated if it contains more than one double bond.
* Unsaturated fat help lower a person’s levels of LDL cholesterol, reduce inflammation and build stronger cell membranes in the body.
* They may help a person reduce the risk of rheumatoid arthritis, according to 2014 study.

**EXAMPLES:**

1. Oleic
2. Linoleic
3. Linolenic
4. Arachidonic

**TYPES OF UNSATURATED FATTY ACIDS:**

These may be classified, based on the degree of unsaturation.

* 1. Monoethenoid acids – These contain one double bond. Example is oleic acid.
  2. Diethenoid acids – Two double bonds. Example is Linoleic acid.
  3. Triethenoid acids – Three double bonds. Example is Linolenic acid
  4. Tetraethenoid acids – Four double bonds. Example is arachidonic acid.

**QUESTION NO 5**

**Explain briefly the models of enzyme substrate interaction.**

**ANSWER:**

**ENZYME:**

* The word enzyme derived from yeast and was used when the catalytic properties of yeast were discovered.
* The word enzyme was first used by scientist Friedrich Kuhne.
* The study of enzymes is called enzymology.
* Enzymes are protein in nature.

**PROPERTIES:**

* Lower activation energy
* Remain unaffected
* Protein in nature
* Reversible reaction

**TYPES:**

Enzymes are of two types:

1. Simple enzymes
2. Complex enzymes

**MODELS:**

There are two models:

1. Lock and key model
2. Induced fit theory
3. **LOCK AND KEY MODEL:**

* This theory was proposed by Emil Fischer in 1898.
* According to this model the active site of enzyme is not flexible structure, actually it is rigid structure.
* The active site is regarded as rigid structure which doesn’t modify or change during the reaction process.
* Both enzyme and substrate are complementary to each other.
* The enzyme acts as loch and substrate acts as a key, which fitted itself at the active site of enzyme to form complex.

1. **INDUCED FIT THEORY:**

* This theory was proposed by Koshland in 1959.
* According to this model, the active site of the enzyme is not rigid actually, it is flexible structure.
* Due to this flexible structure active site must undergo a slight change in structure to more specifically accommodate the substance.
* The presence of substrate molecule induced a conformational change in the enzyme molecule.
* Due to these changes the enzyme performs its catalytic activity in more effective manner.

**........*THE END.........***