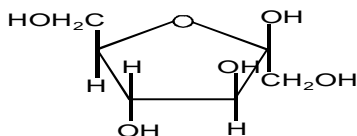


ANSWERS
BIOCHEMISTRY
CARBOHYDRATES

1. Fructose
2. Sucrose or maltose
3. $(C_6H_{10}O_5)_n$
4. Monosaccharides are the simplest carbohydrates which cannot be further hydrolysed.
5. β -D(-) fructofuranose structure:



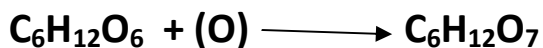
6. *Carbohydrates consumed in the form of food undergo hydrolysis in presence of enzymes to form glucose.
* Glucose is absorbed into blood and taken to the cells.
* In the cells, glucose gets oxidised to form carbon dioxide and water liberating a large amount of energy.
$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{energy}$$

* This energy is used to do work and to keep our body warm.
* Excess glucose is converted into glycogen and stored in liver and muscles.
* During emergency glycogen hydrolyses and acts as a source of energy.
7. i) When glucose is reduced with hydriodic acid in presence of red phosphorus, hexane is formed.
$$\text{Glucose} + HI \longrightarrow CH_3CH_2CH_2CH_2CH_2CH_3$$

This reaction shows the presence of 6 carbon atoms in a

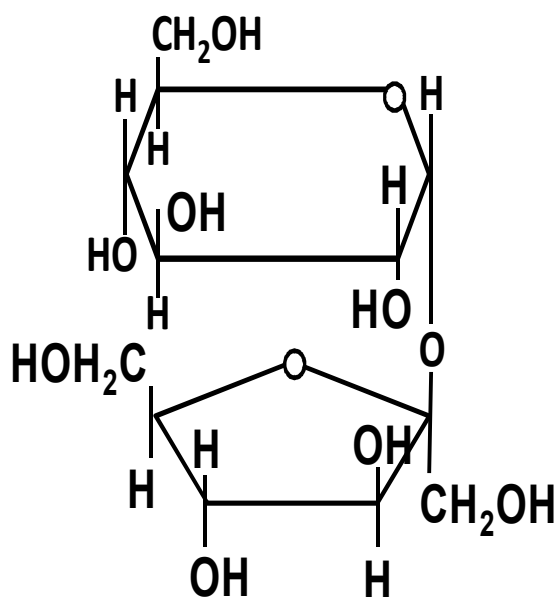
straight chain in a molecule of glucose.

- ii) Glucose reacts with acetic anhydride in presence of pyridine to form penta acetyl derivative. This reaction indicates the presence of five -OH groups in a molecule of glucose.
- iii) In presence of mild oxidising agent like bromine water, glucose oxidises to form gluconic acid ($C_6H_{12}O_7$) which contains same number of carbon atoms as in glucose.

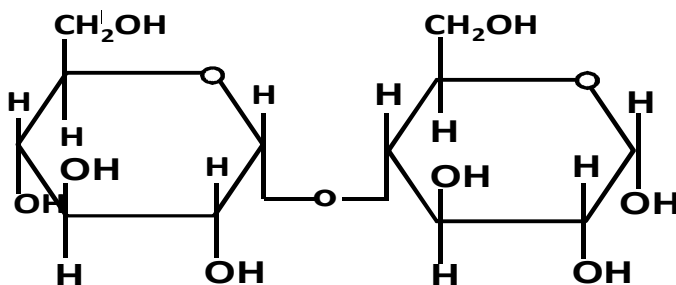


This shows the presence of aldehydic group in glucose.

8. Haworth's structure of i) Sucrose



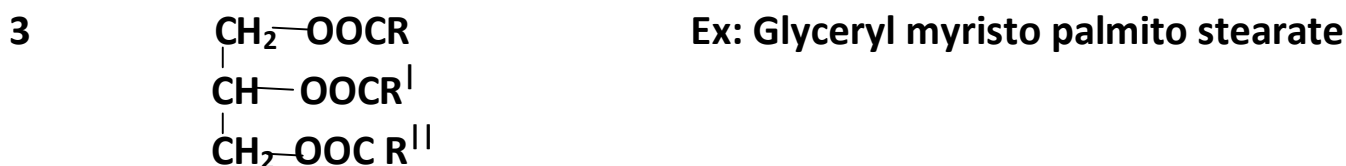
ii) Maltose



OILS AND FATS

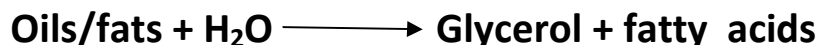
1. Oils and fats are triesters of glycerol and fatty acids.
2. Saturated fatty acids are aliphatic monocarboxylic acids containing long chain alkyl groups attached to $-\text{COOH}$ group.

Palmitic acid..... $\text{C}_{15}\text{H}_{31}\text{COOH}$



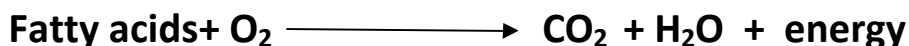
4. *Alkali hydrolysis of triglycerides is known as saponification.
*Sodium palmitate and glycerol are formed.
5. When an oil or fat is exposed to moist air for a long time, it develops an unpleasant smell and sour taste. This phenomenon is called rancidity.
Hydrolytic rancidity can be prevented by refrigerating oils and fats.
6. It is a process of removing impurities like free fatty acids, colouring matter, colloidal impurities, suspended particles, odour and moisture from oil.
* free fatty acids are removed by treating the oil with sodium hydroxide.
Salt formed is removed.
* Colouring matter is removed by using adsorbent like animal charcoal.
* Colloidal impurities are coagulated using citric acid.
* Suspended particles are removed by filtration.
* Odour and moisture are removed by heating the oil using superheated steam coils. Resultant oil is refined oil.
7. When an oil is heated with hydrogen gas in presence of finely divided nickel catalyst at 180°C under pressure, it forms fats. This is called hydrogenation of oils.
8. When certain oils are exposed to air and light, they form hard transparent resin like mass. These oils are called drying oils. Ex. linseed oil.
9. Iodine value is defined as the number of grams of iodine that can add to 100g of an oil.
It is a measure of unsaturation of oils.

10. : * Oils and fats consumed in the form of food undergo hydrolysis in the intestine in presence of the enzyme lipase forming glycerol and fatty acids.



* These fatty acids are absorbed into blood and taken to cells.

* In the cells, fatty acids get oxidised to CO_2 and H_2O liberating large amount of energy.



* Excess fatty acids are converted into fats and stored in different parts of the body and also under the skin.

* This fat deposit acts as reserve food. Fat stored under the skin protects the body from cold. It is also useful in the absorption of Vitamin A and Vitamin D in the intestine.

AMINO ACIDS AND PROTEINS

1. Amino acids are compounds containing both amino and Carboxylic acid group.

2. i). Serine ii) Tyrosine

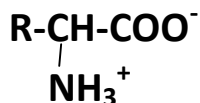
3. i) Alanine: $\text{CH}_3-\underset{\text{NH}_2}{\text{CH}}-\text{COOH}$ ii) Aspartic acid : $\text{HOOC}-\text{CH}_2-\underset{\text{NH}_2}{\text{CH}}-\text{COOH}$

4. 51

5. These are proteins produced in the body when foreign proteins called antigens enter our body. Antibodies fight with antigens and destroy them. Excess antibodies produced remain in blood and provide immunity against the disease.

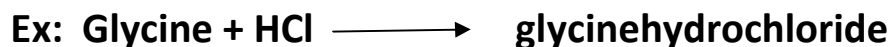
6. It is a process where a protein undergoes change in its physical and biological properties due to the action of heat or acid or alkali.

7. The dipolar ion of amino acid is called zwitter ion.

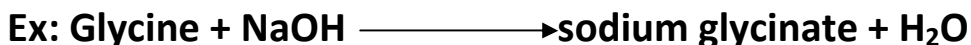


8. Amino acids behaves like an acid well as a base.

i) Basic nature: Amino acids react with acid like HCl to form corresponding hydrochlorides.



ii) Acidic nature: Amino acids react with base like NaOH to form corresponding sodium salt.



These reactions show the basic and acidic nature of amino acids.

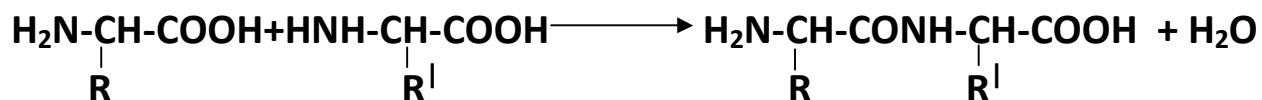
9. * A molecule of amino acid contains 51 amino acid units.

* There are two polypeptide chains of 21 and 30 amino acids each.

* Two polypeptide chains are held together by two disulphide linkages (-S-S-).

* There is an intrachain disulphide linkage (-S-S-) in the polypeptide chain containing 21 amino acids.

10. The -CONH- bond formed between two amino acid molecules with the elimination of water molecule is called a peptide bond.



Three peptide linkages are present in a tetrapeptide.

MONOCARBOXYLIC ACIDS

1. Uses of methanoic acid:

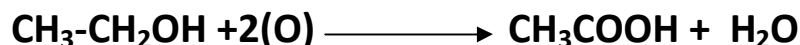
1. used as a coagulating agent for rubber latex.

2. used in the preservation of fruits.

2. When acetic acid reacts with ammonia it forms ammonium acetate which on heating undergoes dehydration to form acetamide.



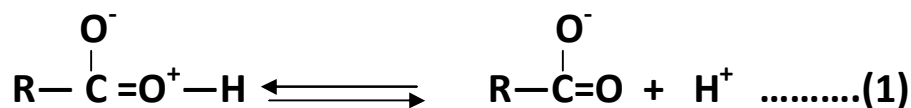
3. When ethanol is heated with alkaline potassium permanganate solution, oxidation takes place forming ethanoic Acid.



4. When Grignard's reagents react with dry carbon dioxide, they form an addition compound which on hydrolysis give monocarboxylic acids.

5. Carboxylic acids are resonance stabilized. Lone pair of electrons on oxygen of –OH group take part in resonance.

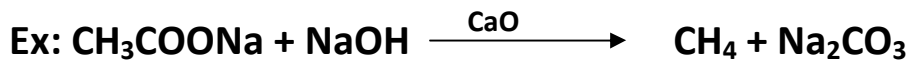
As a result oxygen of –OH group acquires +ve charge and attracts shared pair of electrons of –OH group towards itself. A carboxylate ion is formed releasing a proton.



Carboxylate ion is also resonance stabilized. Since carboxylate ion is more stable, equilibrium (1) shifts to right. Thus carboxylic acid donates a proton and behaves like an acid.

6. HCOOH is stronger acid. i.e., CH₃COOH is weaker acid. This is due to the presence of CH₃- group in CH₃COOH which is electron releasing group due to +I effect.

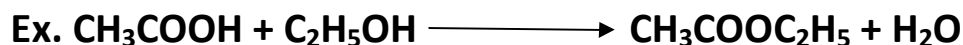
7. When sodium salt of monocarboxylic acid is heated with sodalime, Decarboxylation takes place to form a hydrocarbon.



8. * -ve charge on carboxylate ion decreases and its stability increases.

* Therefore electron withdrawing groups increase the acidic strength of carboxylic acids.

9. Esterification: It is a general reaction where carboxylic acid reacts with alcohol in presence of dehydrating agent like conc. sulphuric acid to form esters.



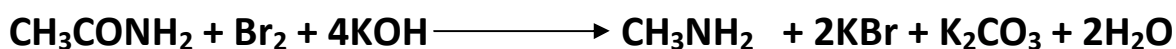
10. * Chlorine is electron withdrawing group due to –I effect.

* It increases stability of carboxylate ion. Hence chloroacetic acid is stronger acid than acetic acid.

AMINES

1. N-methylmethanamine

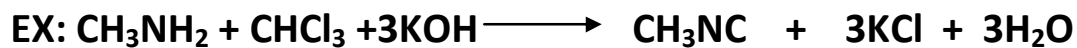
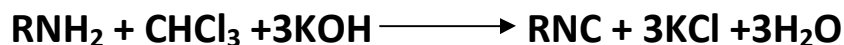
2. Hoffmann's bromide reaction



3. When ethanenitrile is reduced with hydrogen in presence of nickel catalyst at 140 °C under a pressure of 130 atmosphere, we get ethanamine.



4. When a primary amine is heated with chloroform and alcoholic potassium hydroxide solution, corresponding isocyanide is formed which has bad smell.



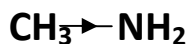
Methylamine

Methyl isocyanide

5. When an aryl amine reacts with nitrous acid at 0-5°C, aryl diazonium salt is formed. This reaction is called diazotization.

6. Nitrogen

7. * CH₃- group in methylamine is an electron donating group due to +I effect.
* CH₃- group increases electron density on Nitrogen and availability of electron pair for donation increases.



Hence methylamine is stronger base than ammonia.

8. Methanamine (because it is stronger base than benzenamine)

9. i) used in the manufacture of azo dyes.

ii) used in the manufacture of drugs like acetanilide.

10. +M effect.

******Good Luck******