Benha University Faculty of Science Chem. Depart.	كلية العلوم	Date : 1 / 9 / 2016 Time :2 hrs.

Final examine of chemistry of Carbohydrate lipids and protein (419Ch) for All 4th year stud. (Sp. & Applied, rad. and Geo. &Chem).

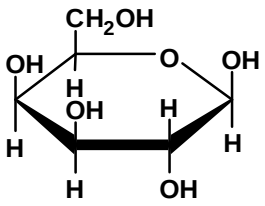
I-Select the correct answer (12 x 2 = 24 Marks):-

1. **Which of these are examples of epimers?**
   (a) Glucose & Maltose (c) Lactose & Galactose
   (b) Glucose & Galactose (d) Lactose & mannose

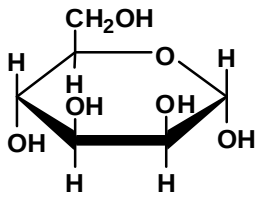
2-Anomers are:

(a) Saccharide isomers that are mirror image of each other.
(b) Saccharides in which all OH groups are equatorial.
(c) Saccharide isomers that vary in the configuration around a single carbon atom.
(d) Isomers that differ only in the configuration of the OH group around the Anomeric C

3- Which of the following correctly represent the Fischer project:



(a)



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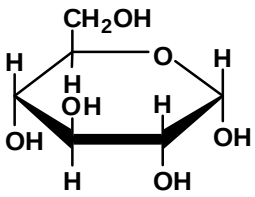

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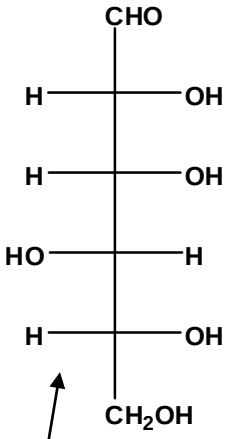
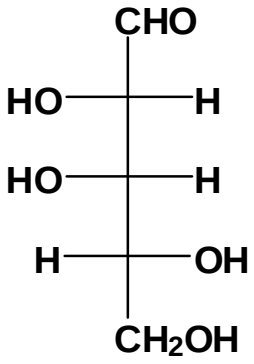


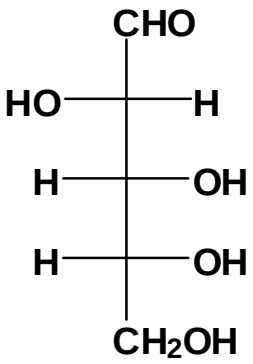
(d)

4- **The symbol " L " means that:**

(a) The compound is Levorotatory
(b) The OH in the last stereo-center is to the left.
(c) The compounds is dextrorotatory
(d) The OH in the last stereo-center is to the right.

5- The following stereo-isomers are related to





(a) Enantiomers
(b) Anomers
(c) Epimers ←
(d) None of the above

6. Which of the carbohydrate molecules are non-reducing agents?

(a) Glucose (b) Maltose
(c)Fructose (d) Sucrose

7. Which of these are correct combinations of monosaccharides to form disaccharides?

(i) Glucose + Glucose = Maltose
(ii) Glucose + fructose = Lactose
(iii) Glucose + fructose = Sucrose
(iv) Glucose + galactose=Lactose

(a) (i),(ii),(iii) only
(b) (ii) only
(c)(i),(iii),(iv)only
(d) All of the above

8. What test is used for reducing sugars:

(a) Biuret test
(b) Ninhydrine test
(c)Glucose Oxidase system
(d) Benedict's test

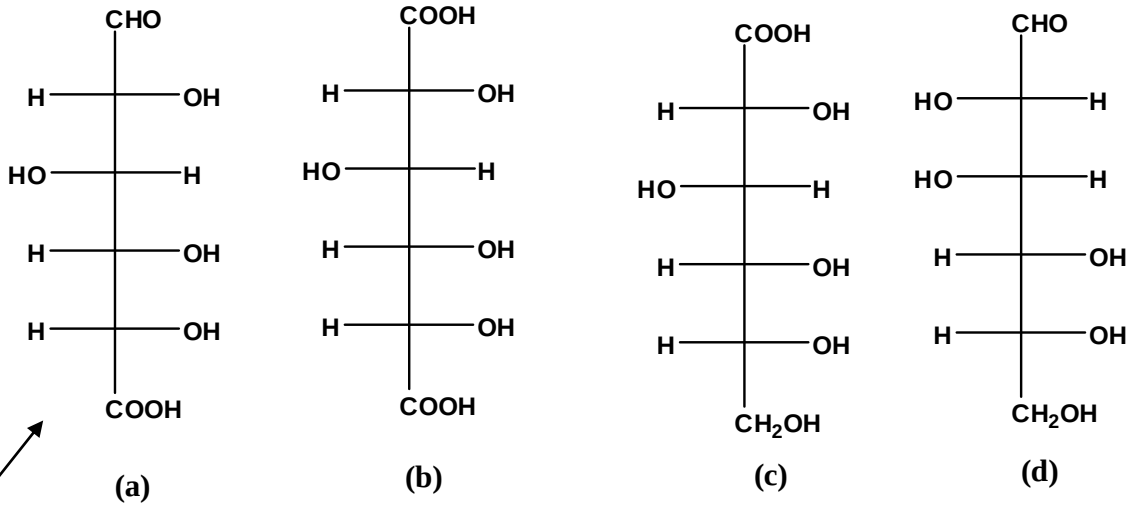
9. Choose the correct order of sugars from carbons three tosix:

(a) hexose,pentose,tetrose,triose
(b) tetrose,hexose,triose,pentose
(c) triose,pentose,tetrose,hexose
(d) triose,tetrose,pentose,hexose

10. A straight chain hexose sugar forms which type of ring?

(a)pyranose ring
(b) ketose ring
(c)benzene ring
(d) furanose ring

11- On enzyme oxidation of D-Glucose gives

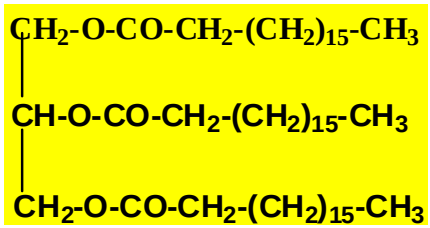


12. What are the two structures making up starch?

(a) Amylose and cellulose
(b) Amylose and amylopectin
(c)Amylopectin and cellobiose
(d) Cellobiose and cellulose

II- Complete the following equations:- (2 x 4 = 8 Marks).

- Triolein+ H_2/ Ni $\xrightarrow{\text{heat}}$



- Tristearein + (Alcoh. NaOH) $\longrightarrow$

CH_3-$(CH_2)_{16}$-COONa + CH_2(OH)-CH(OH)-CH_2(OH)

III- Write short note on (4 x 3 = 12 Marks)

- Rancidity of Fat & Oil

Rancidity

Definition:

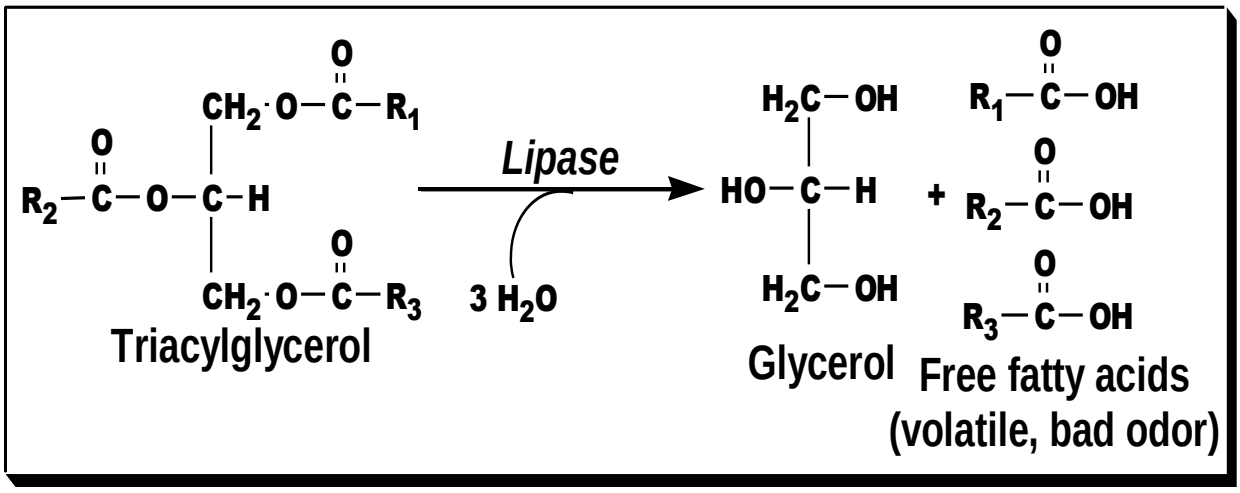
- **It is a physico-chemical change in the natural properties of the fat leading to the development of unpleasant odor or taste or abnormal color particularly on aging after exposure to atmospheric oxygen, light, moisture, bacterial or fungal contamination and/or heat.**

Types and causes of Rancidity:-

1. **Hydrolytic rancidity**
2. **Oxidative rancidity**
3. **Ketonic rancidity**

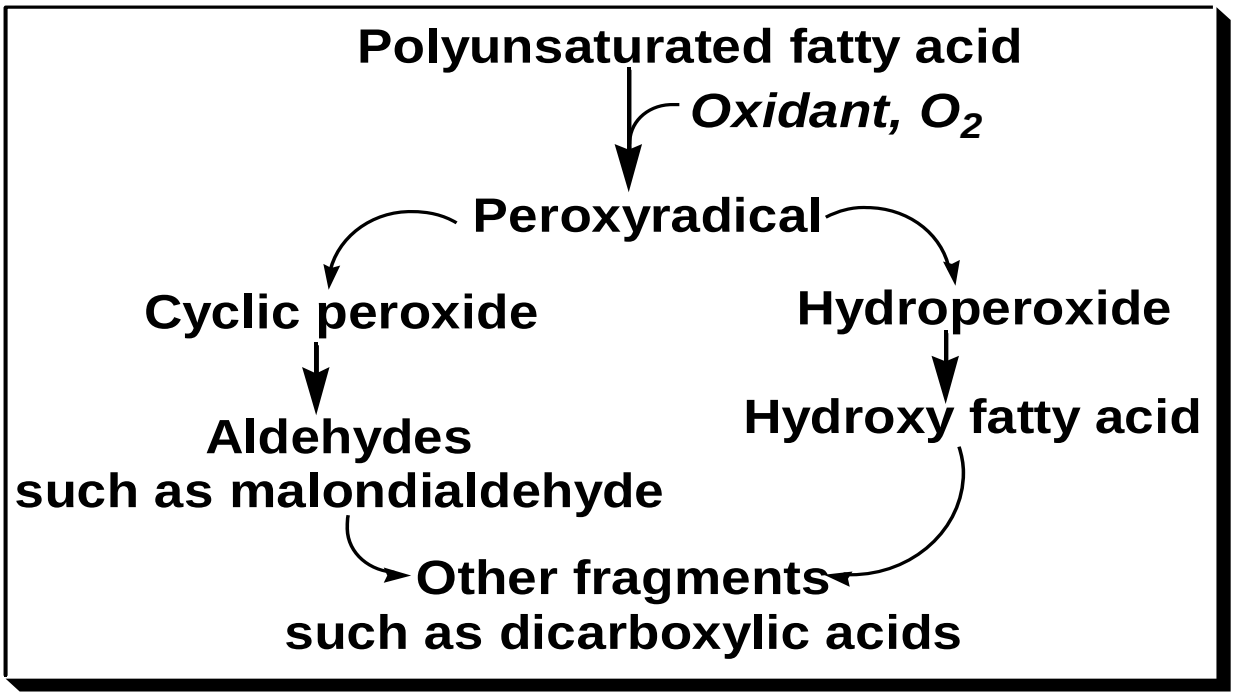
1-Hydrolytic rancidity:

- **It results from slight hydrolysis of the fat by lipase from bacterial contamination leading to the liberation of free fatty acids and glycerol at high temperature and moisture.**
- **Volatile short-chain fatty acids have unpleasant odor.**



2-Oxidative Rancidity:

- **It is oxidation of fat or oil catalyzed by exposure to oxygen, light and/or heat producing peroxide derivatives which on decomposition give substances, e.g., peroxides, aldehydes, ketones and dicarboxylic acids that are toxic and have bad odor.**
- **This occurs due to oxidative addition of oxygen at the unsaturated double bond of unsaturated fatty acid of oils.**

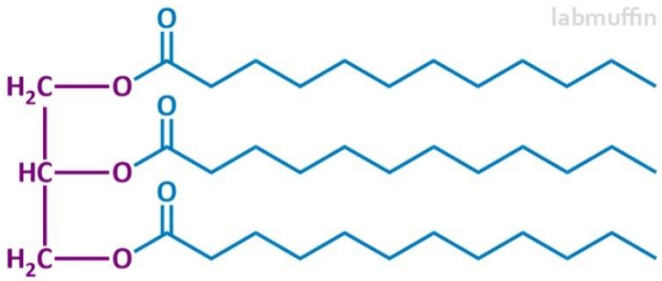


3-Ketonic Rancidity:-

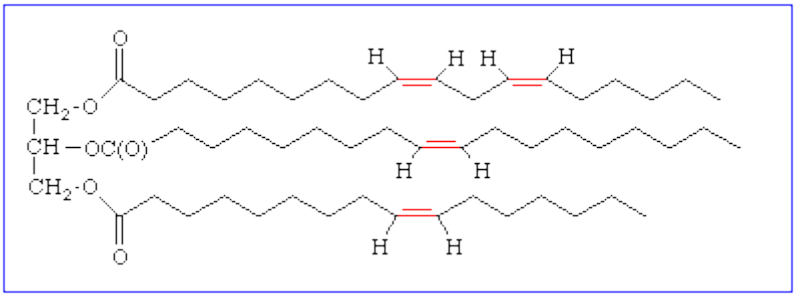
- **It is due to the contamination with certain fungi such as Asperigillus Niger on fats such as coconut oil.**
- **Ketones, fatty aldehydes, short chain fatty acids and fatty alcohols are formed. Moisture accelerates ketonic rancidity.**

- Difference between fat and oil with suitable example for each one.

Fat :Tri ester for Glycerol with saturated fatty acids



Oil : Fat :Tri ester for Glycerol with unsaturated fatty acids



- Essential and nonessential amino acid

Amino acids can be called the "building blocks" of protein and are an important part of every human body. There are 20 different amino acids – nine of which are called "essential" and 11 of which are

labeled as "non-essential." The human body needs all 20 of these amino acids, in varying degrees, to be healthy and fully functional. All 20 have distinct chemical structures and are used for different roles – such as forming neurotransmitters, forming hormones and producing energy. But their primary role is to build proteins.

- **Action of acid and base on glycin**

$$\overset{+}{N}H_3\text{-}CCOO^{-} + HCl \longrightarrow \overset{+}{N}H_3\text{-}CH_2COOH$$

$$\overset{+}{N}H_3\text{-}CCOO^{-} + NaOH \longrightarrow NH_2\text{-}CH_2COO^{-} + H_2O$$

IV- Define the following terms: (4 x 1 = 4 marks)

- **Saponification Value**
- **Acid Value**
- **Iodine Value**
- **Anomeric Carbon**

<u>Iodine number</u> (or value):

- **Definition: It is the number of grams of iodine absorbed by 100 grams of fat or oil.**

- **Saponification number (or value):**
- **Definition: It is the number of milligrams of KOH required to completely saponify one gram of fat.**

- **Acids Number (or value):**
- **Definition:**
- **It is the number of milligrams of KOH required to neutralize the free fatty acids present in one gram of fat.**
- **- Anomeric Carbon**

- **The carbonyl carbon after cyclization becomes the anomeric carbon.**
- **This creates α and β configuration.**
- **In α configuration the OH is on the same of the ring in fischer projection. In Haworths it is on the trans side of CH_2OH.**

GOOD LUCK

Prof. Dr. Wagdy El-Dougdoug

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