

Daily Tutorial Sheet 1

JEE Advanced (Archive)

1.
$$\begin{array}{c} OH \\ O \\ H^{+} \end{array}$$

$$\begin{array}{c} O \\ O \\ C \end{array}$$

$$\begin{array}{c} O \\ C \end{array}$$

$$(C) \qquad \qquad \downarrow D \downarrow_{n}$$

$$H_{2}N - CH - COO^{-} \leftarrow PH = 10 \qquad H_{2}N - CH - COOH \xrightarrow{pH = 2} H_{3} \stackrel{+}{N} - CH - COOH \xrightarrow{CH_{3}} H_{3} \stackrel{+}{N} - C$$

3. Sucrose $\xrightarrow{\text{H}^+}$ D-glucose + D-fructose

D-glucose

4.
$$\begin{array}{c} \text{O} \quad \text{CH}_2\text{C}_6\text{H}_5 \\ \parallel \quad \mid \quad \mid \\ \text{H}_2\text{N}-\text{CH}-\text{C}-\text{NH}-\text{CH}-\text{COOCH}_3 \\ \mid \quad \quad \mid \\ \text{CH}_2-\text{COOH} \\ \text{Aspartame} \\ \end{array}$$

(i) Aspartame has amine, acid, amide and ester groups.

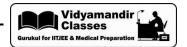
(ii)
$$\begin{array}{c} O & CH_2C_6H_5 \\ || & || \\ H_3 N - CH - C - NH - CH - COOCH_3 \\ || & CH_2 - COO^- \\ Aspartame \end{array}$$

(iii) Aspartame
$$\xrightarrow{H^+}$$
 H_2N CH $COOH$ $+$ $CH_2C_6H_5$ $|$ $|$ CH_2COOH H_2N CH $COOH$ $+$ CH_3OH II

- (iv) II is more hydrophobic due to the presence of phenyl ring.
- **5.** Zeigler Natta Catalyst
- **6.** The dipeptides are

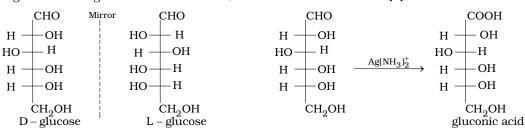
$$\begin{array}{c} \operatorname{HOOC}-(\operatorname{CH}_2)_2-\operatorname{CH}-\operatorname{CO}-\operatorname{NH}-\operatorname{CH}-(\operatorname{CH}_2)_4-\operatorname{NH}_2 \\ | \operatorname{NH}_3 & \operatorname{COO}^- \end{array}$$

and
$$\begin{array}{c} \text{HOOC} - (\text{CH}_2)_2 - \text{CH} - \text{NH} - \text{CO} - \text{CH} - (\text{CH}_2)_4 - \text{NH}_2 \\ | & | & | \\ \text{COO}^- & \text{NH}_3 \end{array}$$



(ii)

7. (i) D-glucose and L-glucose are enantiomers, hence :



- **8.** In structure (A), one ring has a free hemiacetal group, will hydrolyse into open chain in aqueous solution and therefore will reduce Tollen's reagent. Structure (B) has only acetal groups, will not hydrolyse in aqueous solution into open chain, will not reduce Tollen's reagent.
- **9.(BC)** Maltose $\xrightarrow{\text{H}_2\text{O}}$ 2D-(+)-glucose

Sucrose
$$\xrightarrow{\text{H}_2\text{O}}$$
 D-(+)-glucose + L-(-) - fructose Invert sugar

Specific rotation of invert sugar is -20° (Observed rotation is $+52^{\circ} - 92^{\circ} = -40^{\circ}$, which is for 2 moles of mixture). On reaction with Br_2 water, invert sugar forms gluconic acid as one of the product $[HOOC(CHOH)_4CH_2OH]$

10.(C) Statement-I is correct presence of -CHO group in glucose is tested by Fehling's solution test where a reddish-brown precipitate of Cu_2O is formed.

Hence, Statement II is incorrect.

11. [a-p, s] [b-q, r] [c-p, r] [d-s]

Cellulose \rightarrow natural polymer of β -D-(+) glucose having β -glycosidic link.

Nylon-66 \rightarrow Condensation (synthetic) polymer having amide linkage.

Protein → Natural polymer of amino acid having amide linkage.

Sucrose → Disaccharide having glycosidic linkage.

- **12.(D)** Biodegradable polymers tend to consist of ester, amide or ether bonds. Biodegradable polymers have large surface area, minimal chain branching.
- **13.(2)** $-COO^-$ and $-NH_2$ are two basic groups in lysine.
- **14.(A)** The six-membered cyclic ether is known as pyranose while the five membered cyclic ether is known as furanose. Hence, ring (a) is a pyranose and it has ether linkage at α -position that is known as α -glycosidic linkage in carbohydrate chemistry.

15.(ABCD)

$$\text{(A)} \qquad \text{CH}_3 \text{OOC} - (\text{CH}_2)_4 - \text{COOCH}_3 \xrightarrow{\quad \text{H}_2/\text{Ni} \\ \quad \Delta} \\ \text{HOCH}_2 - (\text{CH}_2)_4 - \text{CH}_2 \\ \text{OH} \xrightarrow{\quad \text{Adipic acid} \\ \quad \text{condensation} }$$

(B)
$$H_2NCO - (CH_2)_4 - CONH_2 \xrightarrow{H_2/Ni} H_2N - CH_2 - (CH_2)_4 - CH_2NH_2 \xrightarrow{Adipic acid}$$
 condensation polymer

$$\textbf{(C)} \qquad \qquad \text{H}_{2}\text{NCO} - (\text{CH}_{2})_{4} - \text{CONH}_{2} \xrightarrow{\quad \text{Br}_{2} \quad \quad } \text{H}_{2}\text{N} - (\text{CH}_{2})_{4} - \text{NH}_{2} \xrightarrow{\quad \text{Adipic acid} \quad } \text{condensation polymer}$$

$$\text{(D)} \qquad \text{NC} - \left(\text{CH}_2\right)_4 - \text{CN} \xrightarrow{\quad \text{H}_2 \\ \text{Ni}} \\ \text{H}_2 \\ \text{NCH}_2 - \left(\text{CH}_2\right)_4 - \text{CH}_2 \\ \text{NH}_2 \xrightarrow{\quad \text{Adipic acid}} \\ \text{condensation polymer}$$