ORGANIC CHEMISTRY

BIOMOLECULES

A disaccharide X cannot be oxidised by bromine water. The acid hydrolysis of X leads to a laevorotatory solution. The disaccharide X is
[JEE(Advanced) 2023]

2. Treatment of D-glucose with aqueous NaOH results in a mixture of monosaccharides, which are

[JEE(Advanced) 2022]

3. The structure of a peptide is given below

If the absolute values of the net charge of the peptide at pH = 2, pH = 6, and pH = 11 are $|\mathbf{z}_1|$, $|\mathbf{z}_2|$ and

 $\left|\mathbf{z}_{3}\right|$, respectively, then what is $\left|\mathbf{z}_{1}\right|+\left|\mathbf{z}_{2}\right|+\left|\mathbf{z}_{3}\right|$?

[JEE(Advanced) 2020]

4. Which of the following statement(s) is(are) true?

[JEE(Advanced) 2019]

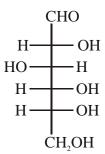
- (A) Oxidation of glucose with bromine water gives glutamic acid
- (B) The two six-membered cyclic hemiacetal forms of D-(+)-glucose are called anomers
- (C) Hydrolysis of sucrose gives dextrorotatory glucose and laevorotatory fructose
- (D) Monosaccharides cannot be hydrolysed to give polyhydroxy aldehydes and ketones
- **5.** Choose the correct option(s) from the following

[JEE(Advanced) 2019]

- (A) Natural rubber is polyisoprene containing *trans* alkene units
- (B) Nylon-6 has amide linkages
- (C) Cellulose has only α -D-glucose units that are joined by glycosidic linkages
- (D) Teflon prepared by heating tetrafluoroethene in presence of a persulphate catalyst at high pressure



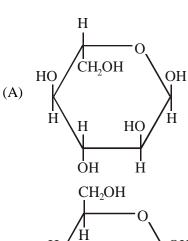
The Fischer presentation of D-glucose is given below.

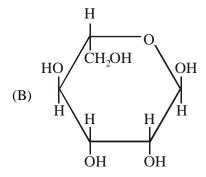


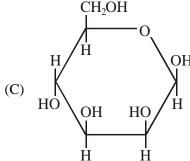
D-glucose

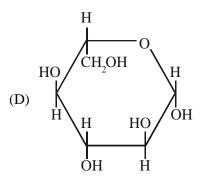
The correct structure(s) of β -L-glucopyranose is (are) :-

[JEE(Advanced) 2018]









7. The structure of D-(+)-glucose is

ÇHO

—OH

-Н

H **—**

HO-

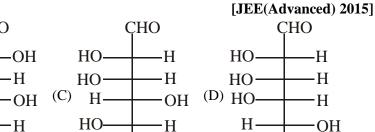
The structure of L(-)-glucose is СНО

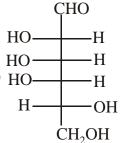
—Н

OH-

HO-

H -





(B) H— (A) HO--н -HHO--HHO-CH₂OH CH₂OH 8. The total number of <u>distinct naturally occurring amino acids</u> obtained by complete acidic hydrolysis of the peptide shown below is [JEE(Advanced) 2014]

SOLUTIONS

1. Ans. (A)

Sol. Sucrose
$$\xrightarrow{\text{H}_3\text{O}^+}$$
 Glucose + Fructose

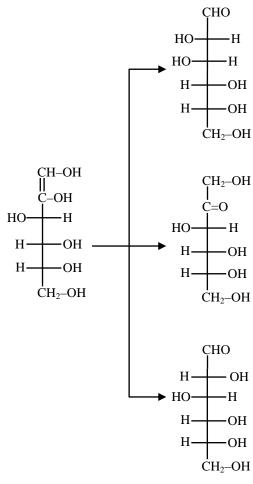
Specific rotation
$$+52.5^{\circ}$$
 -92° (mixture of products is laevorotatory)

Sucrose
$$\xrightarrow{Br_2+H_2O}$$
 No reaction

 $BCD \Rightarrow$ reducing sugars, will get oxidized by $Br_2 + H_2O$

2. Ans. (C)

Sol. Basic catalyse tautomerism through enediol intermediate



3. Ans. (5)

Sol.
$$|z_1| + |z_2| + |z_3| = 5$$

At pH = 2
$$\stackrel{1}{N}H_2$$
 and $\stackrel{2}{N}H_2$ of Tyrosine and Lysine is +ve charged (+1 each)

$$+2 |z_1| = 2$$

At
$$pH = 6$$
 NH₂ of Lysine (+1),

COOH (-1) of glutamic acid,

so because of dipolar ion exist $|z_2| = 0$

At
$$pH = 11$$

COOH of Glutamic acid (-1)

COOH of Lysine (-1)

OH of phenol (-1)

$$|z_3| = 3$$

4. Ans. (B, C, D)

Sol. (1) FALSE: $H \longrightarrow OH$ $CH_2 \longrightarrow OH$

D(+) glucose

Gluconic acid

(2) TRUE : Six member hemiacetal on anomeric carbon gives α -D glucose & β -D glucose.

(3) **TRUE**:
$$C_{12}H_{22}O_{11} + H_2O$$
 Invertase $C_6H_{12}O_6 + C_6H_{12}O_6$
Glucose Fructose $(+)$ $(-)$

(4) TRUE: Monosaccharide cannot be hydrolysed to give polyhydroxy aldehydes and ketones

5. Ans. (B, D)

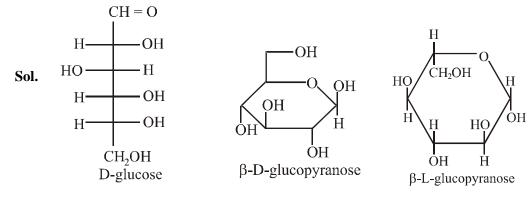
Sol. 1. Natural rubber is polyisoprene containing cis alkene units

2. Nylon-6 has amide linkage
$$\frac{1}{1}$$
HN – $(CH_2)_5$ – C_1 $\frac{1}{10}$

3. Cellulose has only β -D glucose units.

4.
$$F_2C = CF_2 \xrightarrow{Per \ sulphate} \uparrow CF_2 - CF_2 \uparrow_n$$

6. Ans. (D)



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7. Ans. (A)

Sol. The structure of D(+) glucose is

The structure of L(-) glucose which is enantiomer of D(+)-glucose is

8. Ans. (1)

Sol.

 $A \Rightarrow is$ glycine which is only naturally occuring amino acid.