

B.Sc. Part II  
Chemistry Hons.

Organic Chemistry  
Group B  
Carbohydrates

- Dr. Manjeet Kumar

Qn. Discuss the open chain structure of glucose.

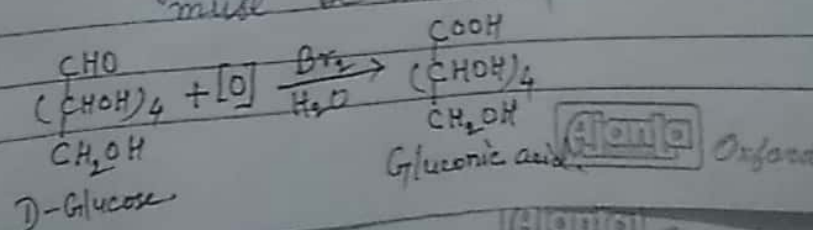
Ans. On the basis of elemental analysis and molecular weight determination, the molecular formula of glucose comes  $C_6H_{12}O_6$ .

1. It forms n-heptane on complete reduction with red P and HI, therefore, all six C-atoms in glucose are in a straight chain.

2. It forms a penta acetyl derivative on acetylation which shows the presence of 5-OH groups. Since it does not dehydrate easily, therefore each -OH group is attached to a separate C-atom.

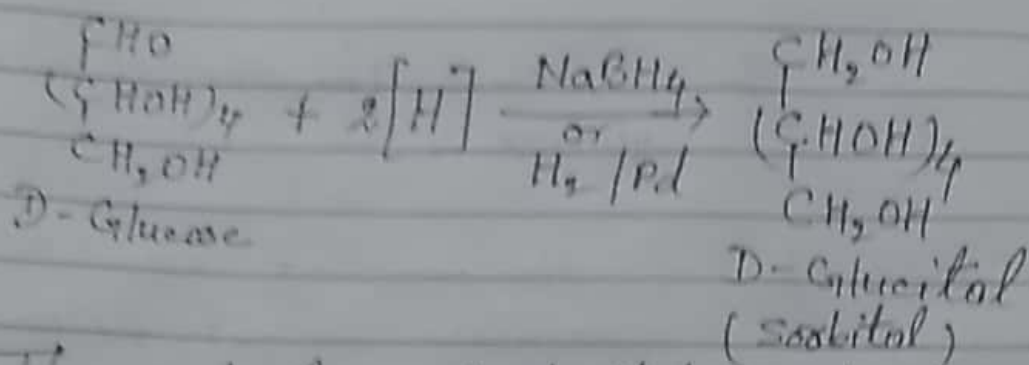
3. It forms a cyanohydrin with HCN or an oxime with hydroxylamine, hence it contains  $C=O$  group.

4. On mild oxidation with  $Br_2$  water, glucose gives gluconic acid (monobasic acid) and contains the same number of C-atoms as glucose so the  $C=O$  groups in glucose must be an aldehydic.



1. Presence of straight chain of six C-atoms:

Glucose on reduction with sodium borohydride ( $\text{NaBH}_4$ ), or catalytic reduction ( $\text{H}_2/\text{Pd}$ ), gives the corresponding alcohol D-glucitol (sorbitol).



The reduction of glucitol with hydrogen iodide and red phosphorus at  $100^\circ\text{C}$ , gives n-hexane. This proves the straight chain structure of glucose.

2. Presence of 5-OH groups:

