McKee Biochemistry 3e

James R. McKee

Chapter 7

Fig. 7.1

An aldose   A ketose
Fig. 7.2

Trioses

\[
\begin{align*}
\text{Glyceraldehyde} & : & \text{D-isomer} \\
\text{Dihydroxyacetone} & & \\
\end{align*}
\]

Fig. 7

Aldoses

Fisher Projections
Stereoisomers
Enantiomers
Diasteromers
(epimers)
Fig. 7.5

Haworth Projections

(a) $\alpha$-D-Glucose

(b) $\beta$-D-Glucose
Chair Conformation of Pyranoses

Anomers
Stabilization
1,3 diaxial interactions

Fig. 7.11

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.
Isomerization of Glucose to Fructose
Epimerization of Glucose to Mannose

Glycosidic Bond Formation
Methyl (Alkyl) Glucosides

Glycosidic linkage?

Disaccharides of Glucose

Celluobiose
Fig. 7.28

Lactose [Gal-b(1,2)-Glc]

Sucrose [Fru-a,b(1,2)-Glc]

Fig. 7.31

Starch – A Homopolysaccharide of Glucose

Amylose - unbranched
Fig. 7.32

Amylopectin and Glycogen - Branched

Fig. 7.33

Cellulose and Chitin – Structural Polysaccharides
Fig. 7.34

**Structure of Cellulose**

Complex oligosaccharides linked to proteins thru ester or ether bonds (O-linked) or amide bond (N-linked)

Fig. 7.30

**Glycoproteins**

Complex oligosaccharides linked to proteins thru ester or ether bonds (O-linked) or amide bond (N-linked)
Table 7.2

Glycoproteins

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
<th>Source</th>
<th>Molecular Weight (D)</th>
<th>Percent Carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme</td>
<td>Ribonuclease B</td>
<td>Bovine</td>
<td>14,700</td>
<td>8</td>
</tr>
<tr>
<td>Immunoglobulin</td>
<td>IgA</td>
<td>Human</td>
<td>160,000</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>IgM</td>
<td>Human</td>
<td>950,000</td>
<td>10</td>
</tr>
<tr>
<td>Hormone</td>
<td>Chorionic gonadotropin</td>
<td>Human placenta</td>
<td>36,000</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>FSH</td>
<td>Human</td>
<td>34,000</td>
<td>20</td>
</tr>
<tr>
<td>Membrane protein</td>
<td>Glycoporin</td>
<td>Human RBC</td>
<td>31,000</td>
<td>60</td>
</tr>
<tr>
<td>Lectin</td>
<td>Potato lectin</td>
<td>Potato</td>
<td>50,000</td>
<td>50</td>
</tr>
</tbody>
</table>

Fig. 7.36

Heteropolysaccharides – Peptidoglycan used in bacterial cell walls
Heteroglycans-Proteoglycans

Important for extracellular matrix.

High carbohydrate content relative to glycoproteins.

Glycosaminoglycans (GAGs) are the principal component.

-linear, disaccharide

-negatively charged