Chapter 5: The Structure and Function of Macromolecules

Class Notes: Part A

I. The Molecules of Life

• Four main classes of large biological molecules:
  1. 
  2. 
  3. 
  4. 

II. Biological Molecules Come in Different Sizes

• Monomer = Subunit or building block molecule of a polymer.
• Polymer = (Poly = many; mer = part) Large molecule connected by similar subunits.
• Macromolecule = (Macro = large) Large organic polymer.
II. Biological Molecules Come in Different Sizes

• Polymers:

III. Synthesis and Breakdown of Polymers

• Condensation (dehydration) reactions =

• Hydrolysis reactions =

Question 5.1
IV. Carbohydrates

A. Monosaccharides

1. Examples include
   • fructose
   • galactose
   • glucose
A. Monosaccharides

Structure:

B. Disaccharides

IV. Carbohydrates

B. Disaccharides =

- Glycosidic linkage =
## IV. Carbohydrates

### C. **Polysaccharides** =

### B. Disaccharides

<table>
<thead>
<tr>
<th>Disaccharide</th>
<th>Monomers</th>
<th>General Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maltose</td>
<td>Glucose + Glucose</td>
<td>Beer brewing sugar</td>
</tr>
<tr>
<td>Lactose</td>
<td>Glucose + Galactose</td>
<td>Milk sugar</td>
</tr>
<tr>
<td>Sucrose</td>
<td>Glucose + Fructose</td>
<td>Table sugar; transport sugar in plants.</td>
</tr>
</tbody>
</table>

### Question 5.2

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C. Polysaccharides

Important functions:
1.
2.

C. Polysaccharides

1. Starch

C. Polysaccharides

2. Glycogen

...
C. Polysaccharides

3. Cellulose

Monomers are connected with β 1-4 linkage.

Monomers are connected with α 1-4 linkage.

Fig 5.7a, 5.7b, c
Question 5.3

V. Lipids

• Three types:
  triacylglycerols (triglycerides), phospholipids and steroids (sterols).

A-1. Triacylglycerols (TAG)

• Structure:
  –
  –

• ester linkages
A-1. Triacylglycerols

A-2. Fatty acids on TAG

- Saturated fatty acids
- Unsaturated fatty acids

Hydrogenation = Adding H-bonds to unsaturated fatty acids to produce saturated fatty acids.
A-3. Useful Functions for Fats

•

*200 lbs (25% body fat) -> 250 lbs (25% carbohydrate stores)

•

B. Phospholipids

• Structure:
  -
  -
  -

• Function:
  -
C. Steroids (Sterols)

• Structure:
  
• Example-Cholesterol:
  

Question 5.4

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\text{[Diagram of cholesterol molecule]}
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