

## Give an Account of the Structure of Carbohydrates

### Monosaccharides - single sugar units

- contain C, H, O in ratio  $C_n H_{2n} O_n$
- eg triose  $C_3 H_6 O_3$  / pentose  $C_5 H_{10} O_5$  / hexose  $C_6 H_{12} O_6$
- Hexose sugars are isomers - same <sup>chemical</sup> formula, different structural.
- $\alpha$  glucose - describe / draw structure
- $\beta$  glucose - describe / draw structure
- fructose - describe / draw structure.

### Disaccharides

- 2 sugar units joined by condensation reaction
- $C_{12} H_{22} O_{11}$  for 2 hexose joined
- held by glycosidic bond
- diagram / description of formation of ~~of~~ maltose / sucrose  
eg maltose - OH on C1 of one glucose reacts with OH on C4  
of adjacent glucose  
releasing water  
joined by remaining O atom.
- maltose =  $\alpha$  glucose +  $\alpha$  glucose
- sucrose =  $\alpha$  glucose + fructose

### Polysaccharides

#### Starch

- polysaccharide of  $\alpha$  glucose / involves 1,4 glycosidic bonds
- amylose and amylopectin
- amylose coiled / helical
- amylose unbranched
- amylopectin branched due to 1,6 glycosidic bonds (every 12 glucose)

#### Glycogen

- polysaccharide of  $\alpha$  glucose / involves 1,4 glycosidic bonds
- branches due to 1,6 glycosidic bonds more frequent than amylopectin

## Cellulose

- Polysaccharide of  $\beta$  glucose
- alternate  $\beta$  glucose molecules rotate/flip to allow glycosidic bonds to form.
- linear, straight chains
- Cross-linking between parallel cellulose chains occurs by H bonds.
- forming cellulose fibres.
- cellulose fibres form layers giving strength.