Oxford Cambridge and RSA

A Level Biology A

H420/02 Biological Diversity

Question Set 5

1 (a) (i) Fig. 20 shows the disaccharide lactose, which is found in milk.

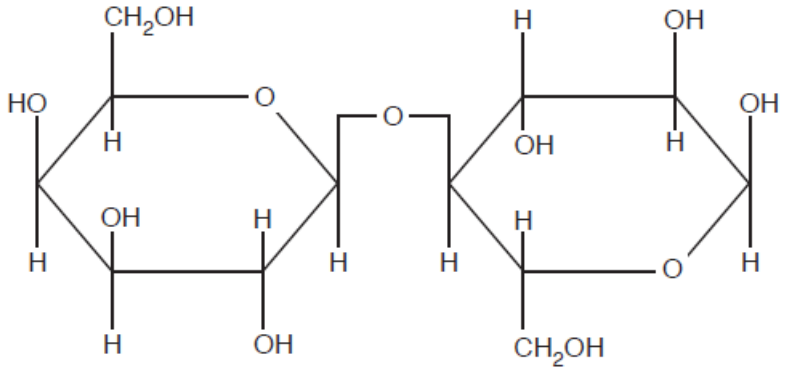

Fig. 20

Another disaccharide is maltose. Maltose and lactose both contain the same number ofatoms of each element, C, H and O.

State two **other** structural similarities between lactose and maltose.

[2]

(ii) Complete the table below to identify differences between the structures of lactose and maltose. The first one has been completed for you.

Lactose	Maltose
one glucose monomer and one galactose monomer	both monomers are glucose

[3]

(b) (i) One of the monomers of lactose is galactose.

The bacterium *E. coli* usually uses glucose as a respiratory substrate.

Under certain circumstances, *E. coli* is able to use galactose as a respiratory substrate by breaking down lactose into glucose and galactose and then using both glucose and galactose as respiratory substrates.

Explain how the structure of galactose allows it to be used as a respiratory substrate.

[3]

(ii) *E. coli* usually grows in conditions where the extracellular concentration of lactose is low. In such conditions lactose does not easily cross the bacterial cell surface membrane.

Suggest and explain why lactose is unable to cross membranes. **[2]**

(iii) In order for lactose to enter the cytoplasm of *E. coli* a protein is required.

The *E. coli* living in the digestive system of young mammals are more likely to contain this protein than *E. coli* living in the digestive system of old mammals.

Suggest an explanation for this observation. **[2]**

(c) Lactose is a reducing sugar.

Benedict's reagent can be used to detect the presence of lactose in a solution.A colorimeter can be used to measure the concentration of lactose.

The colorimeter first needs to be calibrated.

Describe how a method that uses Benedict's reagent and a colorimeter could be calibrated to measure the concentration of lactose in an unknown sample. **[4]**

Total Marks for Question Set 5: 13