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Department of Biochemistry, University of Oulu

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Biomolecules for Biochemists 740143P (8 op)

Biomolecules for Bioscientists 740147P (8 op)

Biomolecules 740148P (5 op)

25/42 P

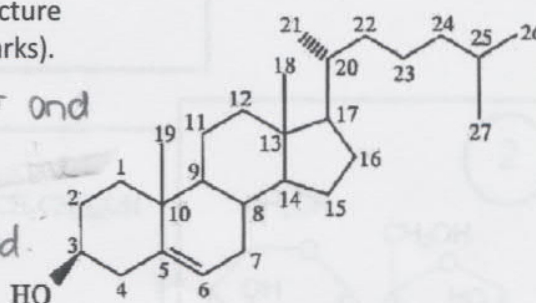
TEST, 7.2.2013, carbohydrates and lipids

Lecturer: Tuomo Glumoff

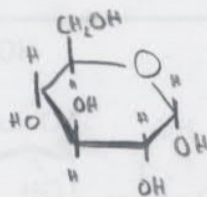
THE TEST TIME WILL BE EXACTLY 1 HOUR 15 MINUTES!**CHECK THAT YOU HAVE 4 PAGES!**

1) Explain shortly how a molecule with this type of structure will affect the properties of a membrane bilayer. (4 marks).

It can attach to membrane bilayer and make it more hydrophobic! The OH-group can have a hydrogen bond.

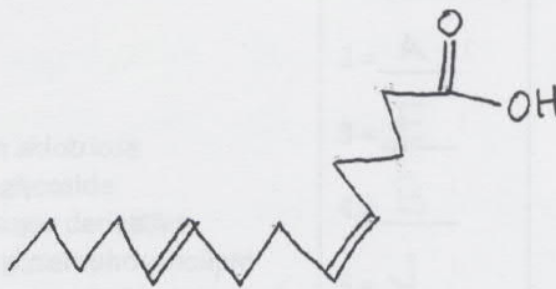


2) Draw the structure of glucose either in the Fisher (open chain) or Haworth (ring; either pyran or furan ring) projection. (4 marks).



4

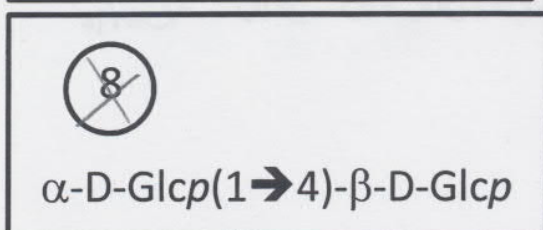
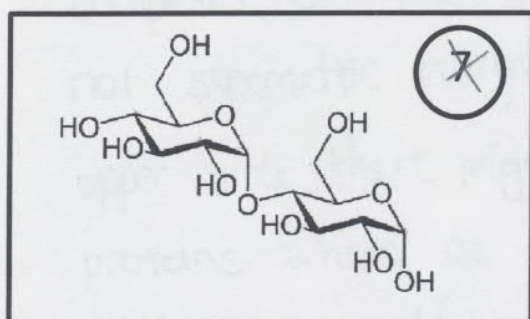
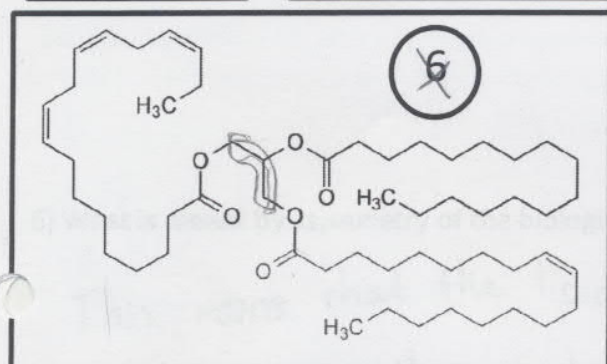
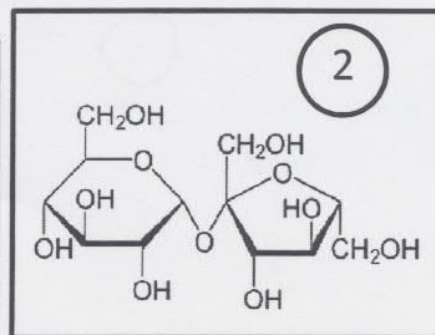
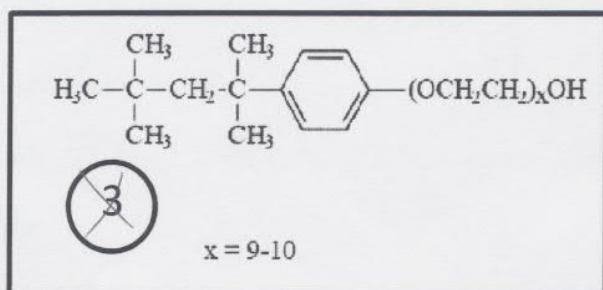
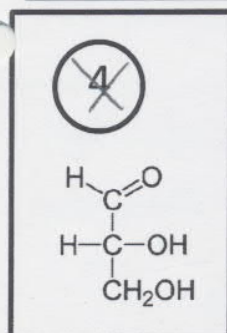
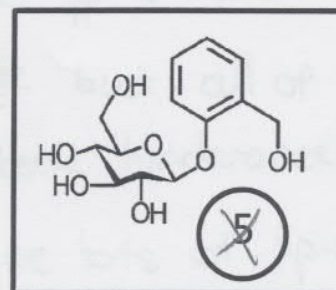
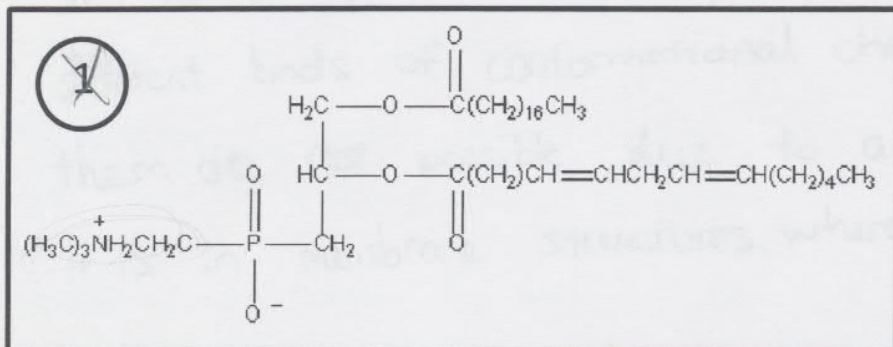
3) Name the following fatty acid according to the systematic nomenclature system (4 marks).



14:2cΔ5, +Δ9

4

4) Here are some molecules and list of molecule names you should be able to recognize. Please combine the right letter indicating the name with the right number for the molecule. There are more names than needed and there may be cases, where more than one name is possible. In the latter case choose one of the possible ones. (8 marks)



- ☒ B an aldotriose
- ☐ A a glycoside
- ☒ J a sugar derivative
- ☒ G a glycerophospholipid
- ☐ C a non-reducing sugar
- ☒ F a reducing sugar
- ☒ H two pyranose rings
- ☐ K a wax
- ☐ E a detergent
- ☒ D a triacylglycerol

Your answers:

- 1 = G
- 2 = A
- 3 = E
- 4 = B
- 5 = J
- 6 = D
- 7 = H
- 8 = F

8

5) Describe shortly and/or use a drawing to explain the structure of a lipid raft - what is it, where is it, what does it contain, why it is like that? (8 marks)

It is a structure of lipids where lipids have different kinds of conformational change but all of them are not possible due to a steric hindrance. It is in membrane structures where are lots of lipids.

6) What is meant by asymmetry of the biological membrane? (3 marks)

This means that the lipids and carbohydrates can form complexes on the biological membrane so that it is not symmetric everywhere around the membrane. For example: Upper side there might be lots of membrane spanning proteins where as down there might be more glycoproteins which are anchored in the lipid bilayer.

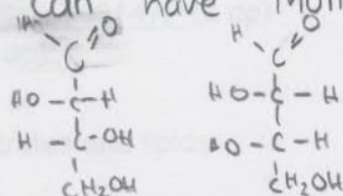
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3

7) Please define the following concepts (6 marks):

a) epimer

Sugars which can have multiple changes but the change only in one place



1.5

b) enantiomer

The molecule have same atoms in the structure but there are also conformational changes.

0

c) omega fatty acid

nomelanture system for fatty acids where the first carbon is in the methyl group and the last in the carboxyl group.

d) liposome

Lipid-bilayer formed vesicle that can transfer molecules everywhere in the cell and outside the cell, for examble hormones.



1.5

8) A glucose molecule can go through a synthetic membrane with the speed of 4×10^{-10} cm/s, but through a red blood cell membrane with the speed of 2×10^{-5} cm/s. Why? (2 marks).

It is faster in the red blood cell because there are lots of lipids and corbohydrates and their derivates that helps the going through a membrane. There are also different proteins that allows glucose to go through the membranen via conformational change of a protein.

2

9) Explain shortly the difference in the cell envelope structure between Gram positive and negative bacteria (3 marks).

One difference between Gram pos and Gram neg. is in the envelope structure: the bonds between the lipid structures are differently crosslinked. The other reason is the different amount of lipid structures.

1