

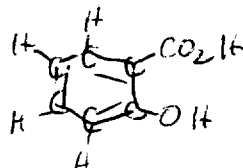
Department of Chemistry
University of Missouri-St. Louis

Name _____
Chemistry 6

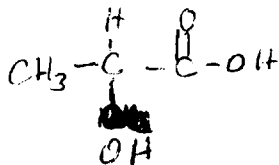
Exam 4
Fall 1999

1. (16 pts) Give structures for the following compounds.

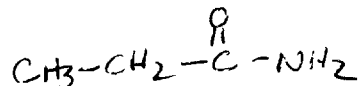
A. 2-hydroxybenzoic acid



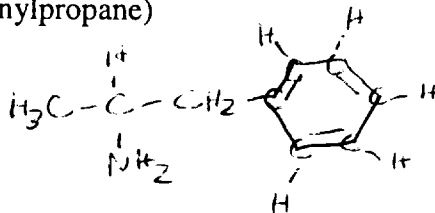
B. 2-hydroxypropanoic acid (also known as lactic acid)



C. propanamide

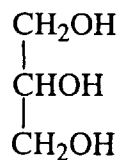


D. Benzidine (2-amino-1-phenylpropane)

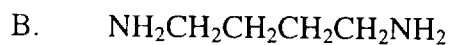


2. (16 pts) Name the following compounds:

A.

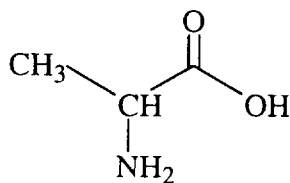


1,2,3-trihydroxypropane



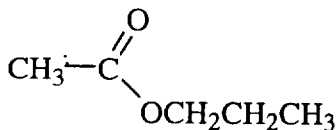
1,4-diamino butane

C.



2-amino propanoic acid

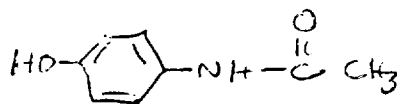
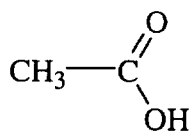
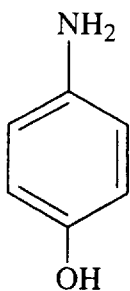
D.



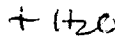
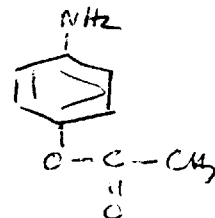
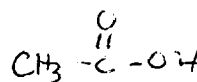
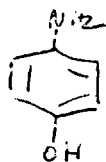
propyl ethanoate

(the odor and flavor of pears)

3. (8pts) A. Draw the structure of the **amide** that would be produced by reacting 4-amino-1-hydroxybenzene with ethanoic acid. This compound is known as acetaminophen



B. A. Draw the structure of the **ester** that would be produced by reacting 4-amino-1-hydroxybenzene with ethanoic acid.



4. (16pts) A. Many amine-containing drugs are given to patients in their salt form, such as the hydrochloride or sulfate. What might be the reason for this?

to increase aqueous solubility → transport through blood

B. Describe in qualitative terms the difference in structure between cellulose and starch.

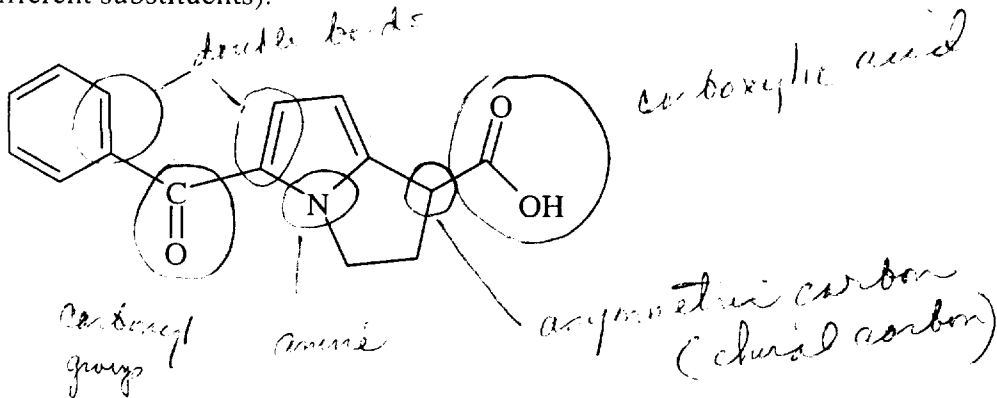
the only major difference is the stereochemistry at the 1-position of the glucose



C. What is an essential amino acid?

an amino acid that needs to be included in the diet. Can not be made by the body

5. (8pts) Toradol is used in dentistry to relieve pain. Circle and name the functional groups and any asymmetric carbon atoms (remember an asymmetric carbon is one with 4 different substituents).



6. (16pts) A. Draw abbreviated structures of all the isomers of a small protein that contains a total of three L-amino acids, two phenylalanine (phe) and one alanine (ala). You may use the abbreviations such as -phe-phe- to indicate your structures.

$n=2$ phe-ala-phe-CO₂H
 $n=2$ ala-phe-phe-CO₂H
 $n=1$ phe-phe-ala-CO₂H

B. The structures you have drawn in question 6A provides information about the primary, secondary, tertiary or quaternary structure? Circle the best answer.

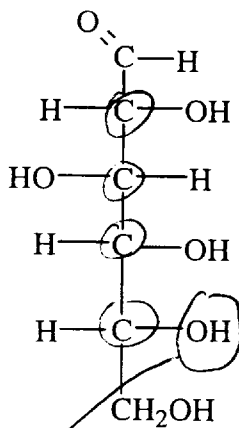
primary

C. Name three types of attractive interactions that are responsible for formation and maintenance of the tertiary structure of a protein

*hydrogen bonding
salt bridges
disulfide linkages*

hydrophobic interactions

7. (10pts) The following questions relate to the following compound:



4 ans

a: Is this a sugar?

YES

b: Is this a D or L sugar?

c: Is this a reducing sugar?

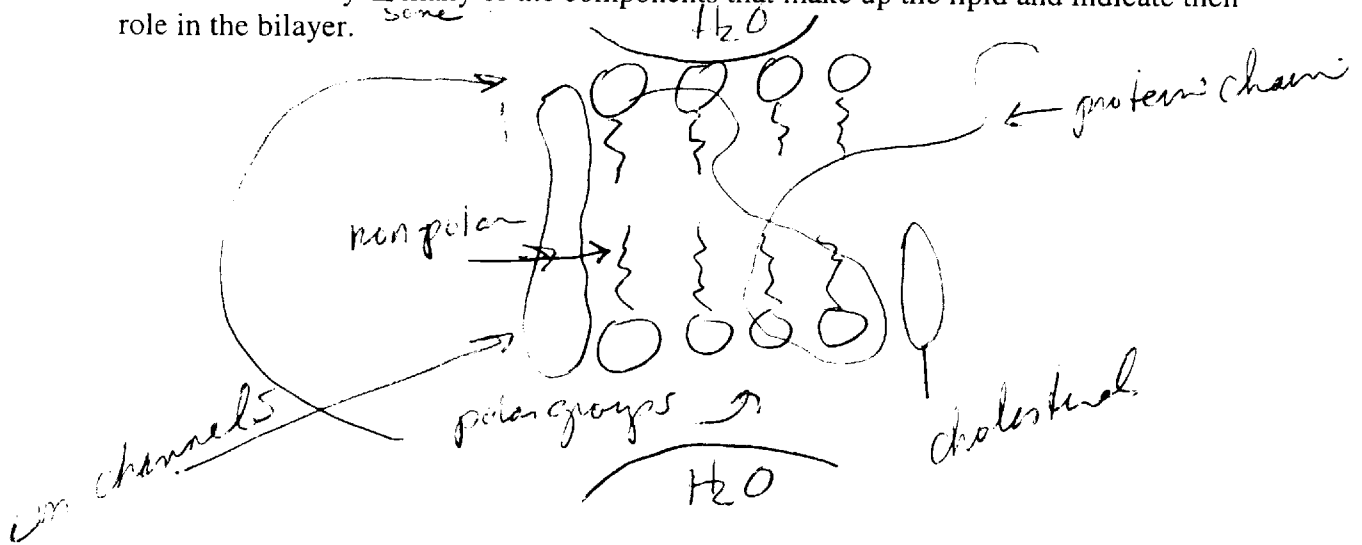
YES

d: How many asymmetric carbon atoms does it contain?

4

e: If it were to cyclize to form a ring, circle the oxygen of the hydroxyl group that would get incorporated if it were to form a 6 membered ring.

8. (10pts) Describe and/or draw a cartoon describing the structure of a lipid bilayer. Be sure to identify ~~as many~~ ^{some} of the components that make up the lipid and indicate their role in the bilayer.



9. In mayonnaise, egg yolks are used to mix oil and vinegar together so they won't separate. This process is called emulsification (we have the French to thank for mayonnaise). The lipids in egg coat the oil particles preventing them from coming back together.

Place 1 egg yolk, ¼ teaspoon salt, and ½ teaspoon vinegar in a bowl and mix with an electric egg beater. Add ½ cup of oil, slowly at first, drop by drop, to the mixture and faster as it thickens. This allows small amounts of oil to be coated by the emulsifying agent in the egg yolk. Add a teaspoon of vinegar. The product should be yellow and shiny with no separate layers.

For five extra points, describe what properties the emulsifying agent in the egg yolk must possess to bring together oil and vinegar (this works in politics as well). Happy holidays and don't eat too much mayonnaise!

it needs to have a nonpolar (interior) + polar group on the outside or just the opposite polar group on the inside + non-polar group on the outside to dissolve the emulsify the fat (oil) and keep the H₂O from separating

vinegar is 95% water

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