BCH 4053 **HOUR TEST 2** **NAME**_____
February 28, 2003

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(10) 1. Describe two methods of cleaving disulfide bonds prior to sequencing a protein, indicating the reagents used in each case and the structure of the cysteine residue produced after the cleavage.

(6) 2. A peptide was subjected to the following degradative techniques resulting in the fragments with the indicated sequences.

I. Cyanogen bromide treatment

Asp-Ile-Lys-Gln-Met
Lys-Val-Ser
Lys-Phe-Ala-Met
Tyr-Arg-Gly-Met

II. Trypsin hydrolysis

Gln-Met-Lys
Gly-Met-Asp-Ile-Lys
Phe-Ala-Met-Lys
Tyr-Arg
Val-Ser

Give the complete sequence of the original peptide.

(6) 3. Fill in the following blanks with **a helix** or **disordered** to represent the primary conformation of the indicated synthetic polypeptide at the indicated pH.

Polypeptide	**pH 2**	**pH 7**	**pH 12**
polyglutamate	_____	_____	_____
polylysine	_____	_____	_____

(12) 4. Given the following data on five different proteins:

Protein	M.W	D	pI
cytochrome c	13,400	11.4	10.6
fibrinogen	330,000	2.0	5.6
serum albumin	65,000	5.9	4.8
ovalbumin	45,000	7.8	4.6

Assume all proteins have partial specific volumes of about 0.73 ml/g. Indicate in the blanks the protein(s) with the indicated behavior.

_____ (a) Elutes **second** from a gel filtration column.

_____ (b) Does not bind to a DEAE column at pH 7.4. (i.e., an anion exchange column).

_____ (c) Does not bind to a carboxymethyl cellulose column at pH 5.0. (i.e., a cation exchange column).

_____ (d) Migrates fastest on electrophoresis in SDS.

(6) 5. Draw a Ramachandran map, label the axes properly, and indicate on the map the conformational location of (a) an alpha helix, (b) a beta sheet, (c) collagen.

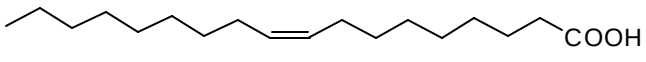
(12) 6. Using the Haworth projection, draw the **structure** of:

(a) an **anomer** of β-D-fructose (b) an **epimer** of β-D glucose

(c) maltose. (d) the monosaccharide building block of **chitin**, the major structural polymer of insects.

(3) 7. What is the structural relationship between L-glycerol-3-phosphate and D-glycerol-1-phosphate?

(16) 8. Complete the following table by supplying the missing information on each fatty acid. Be sure to show the double bonds in the correct *cis* or *trans* orientation.

Abbreviation.	**Common Name**	**Systematic Name**	**Structure**	**Omega designation**
9,12 -$C_{18:2}$				
	a-linolenic acid			
				
	arachidonic acid			

(6) 9. Phosphatidyl ethanolamine and lysophosphatidyl ethanolamine form different types of aggregate structures. Describe the different structures (words or diagram), and explain what structural difference between the two lipid molecules accounts for this difference.

(8) 10. **Circle** the following lipids which are negatively charged at pH 6, and **underline** those that contain a nitrogen atom.

phosphatidyl choline	phosphatidyl serine
phosphatidyl glycerol	cholesterol
sphingomyelin	palmitic acid
phosphatidic acid	phosphatidyl inositol

(9) 11. Distinguish between integral and peripheral membrane proteins in terms of

(a) types of solutions used to extract them from membranes.

(b) forces by which they are attached to membranes.

(c) membrane location in the fluid mosaic model.

(6) 12. Four types of lipid-linked anchors are known that attach proteins to membranes. Describe two of them, including the lipid involved and the manner in which the lipid is attached to the protein.