CHM 3352 Exam 1

TUD Department of Chemistry

11 points each

Summer 2019

1) Supply the structure, name, and three letter abbreviation for amino acids which match the following criteria (if more than one amino acid meets the criteria you should only supply one):

a) Side-chain contains a hydroxyl group and contains an aromatic ring

b) Side-chain contains a five-membered ring but is not histidine

c) Side-chain contains an asymmetric carbon but is not Ile

d) Side-chain contains sulfur but not a sulfhydryl group

e) Side-chain is neutral at pH 7 and negative at pH 11

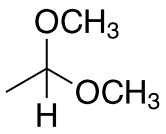
2) Draw the structures of:

a) D-glucose (open-chain or linear form)

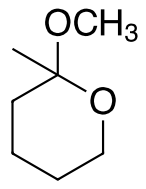
b) D-ribose (∝ furanose (cyclic)form)

c) D-fructose (cyclic form)

3) Classify I and II below as either hemi-ketal, ketal, hemi-acetal or acetal and draw the structure(s) that would result if they were subjected to aqueous acid hydrolysis

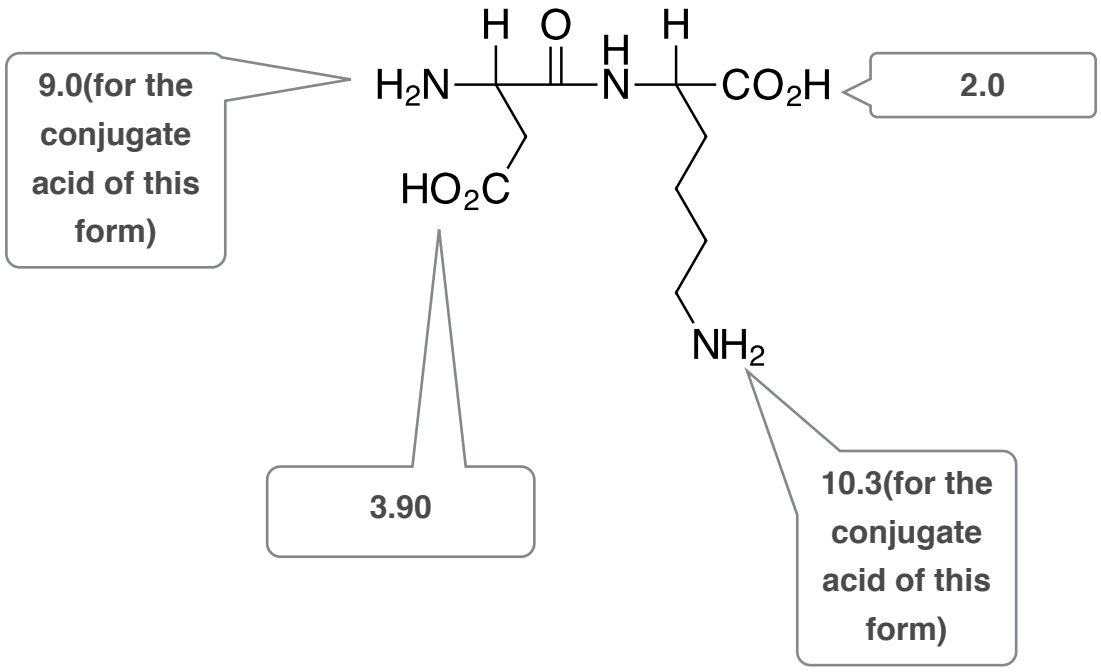


I



II

4) The dipeptide below is drawn with all ionizable groups in their neutral forms. Given the noted pK_as for the ionizable groups, write the expected net charge on the structure at the indicated pHs



	Net Charge
pH=1	
pH=7	
pH=13	

5) Answer the following:

HAc=$HC_2H_3O_2$ (acetic acid) NaAc=$NaC_2H_3O_2$ (sodium acetate)

a) What is the pH of a solution prepared by mixing 25 mL of 0.1M HAc and 25 mL of 0.20M NaAc (pKa for HAc= 4.24)

b) What is the $[OH^{1-}]$ in an aqueous solution with pH= 9.5?

c) What is K_a for HAc?

d) What is the pH if 50 mL of 0.1 M HCl is added to 50 mL of 0.2 M NaAc?

e) Write the Henderson-Hasselbalch equation.

6) Briefly describe the structures of cellulose and of starch and explain why no creatures other than bacteria are able to digest cellulose.

7) Draw a triaclyglcerol that contains the following fatty acids:

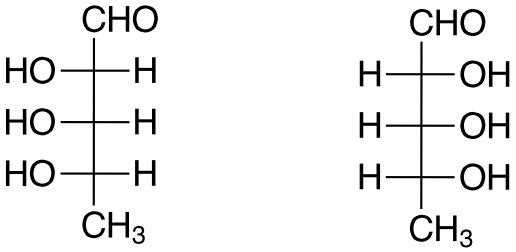
8:1 Δ^7 and all cis-8:2 $\Delta^{3,5}$ and trans-8:1 Δ^6 .

8) What is a micelle ?

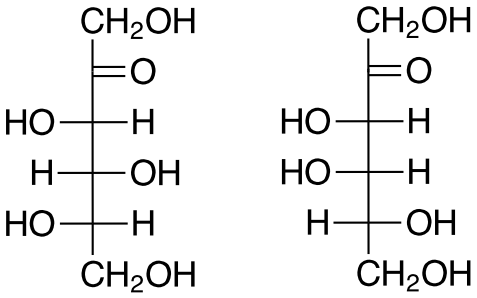
9) What is the stereochemical relationship between the two molecules in each of the pairs below?

The choices are: same, enantiomers, diastereomers, epimers (if more than one term applies state all of them)

a)



b)



2 point bonus: What is the correct name for the structure below