

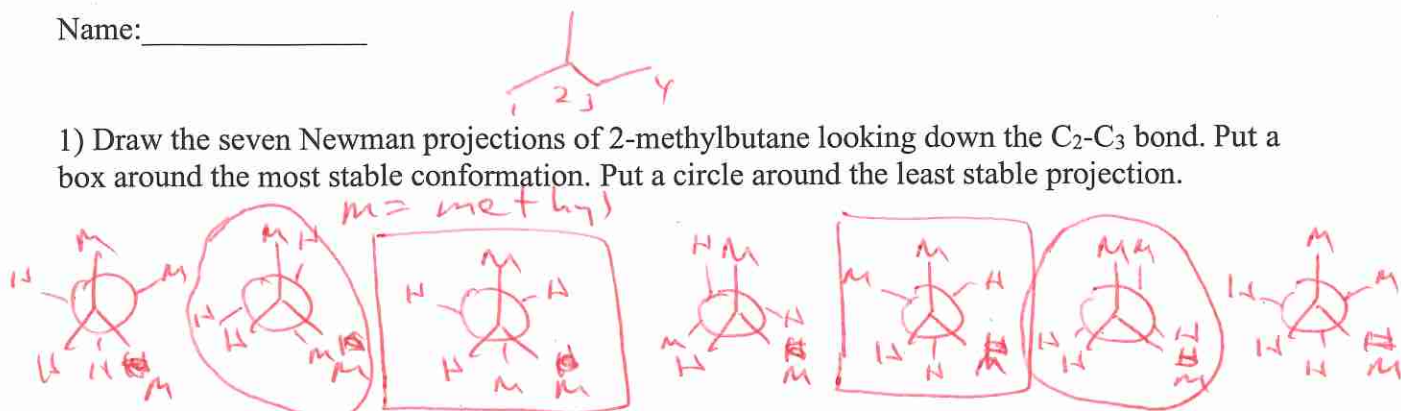
# Assignment # 6

Organic 211

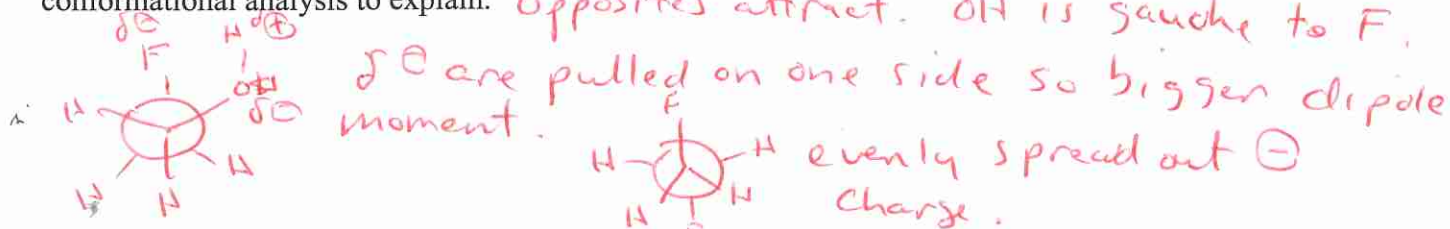
Fall 2020

Name: \_\_\_\_\_

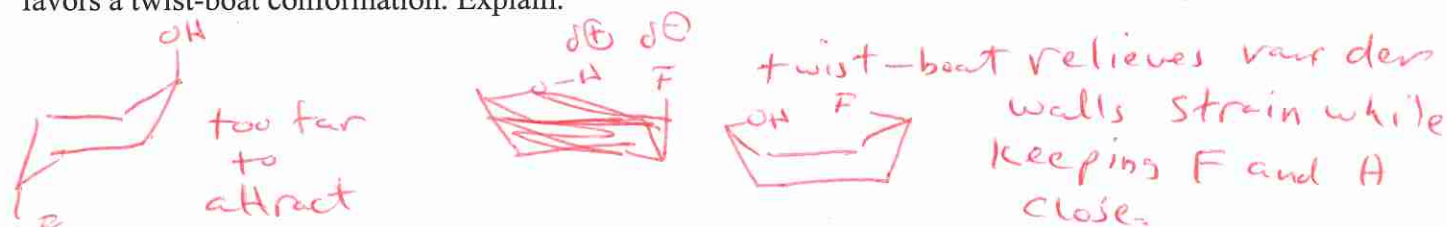
1) Draw the seven Newman projections of 2-methylbutane looking down the C<sub>2</sub>-C<sub>3</sub> bond. Put a box around the most stable conformation. Put a circle around the least stable projection.



2) The molecular dipole moment for FCH<sub>2</sub>CH<sub>2</sub>OH is much larger than that for FCH<sub>2</sub>CH<sub>2</sub>F. Use conformational analysis to explain.



3) Trans-4-fluorocyclohexanol exists largely in a chair conformation, whereas the cis isomer favors a twist-boat conformation. Explain.



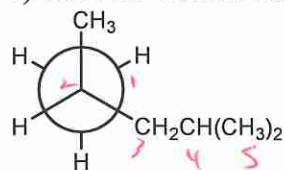
4) The rotational energy barrier about the C-C bond in ethyl bromide is 3.7 kcal/mole. What is the energy cost of eclipsing a C-H bond? What is the energy cost of C-Br bond? SHOW YOUR WORK.

pick a value for eclipsing C-H bond 1.0 kcal/mole

$$2 \times 1 = 2 \text{ kcal for H's eclipsing}$$

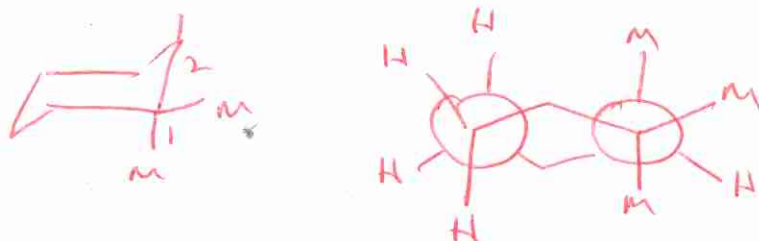
$$3.7 - 2.0 = 1.7 \text{ for Br eclipsing H. Br is larger.}$$

4) Give an IUPAC for the following Newman projection.

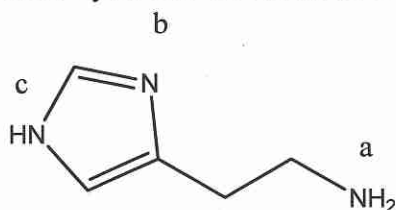


2,4-dimethylpentane

5) Draw the Newman projection for 1,1,2-trimethylcyclohexane in a chair conformation.



6) You need 300. mLs of a 5.00 M solution of histamine (a solid) in water. How much histamine would you add in GRAMS? How much water?



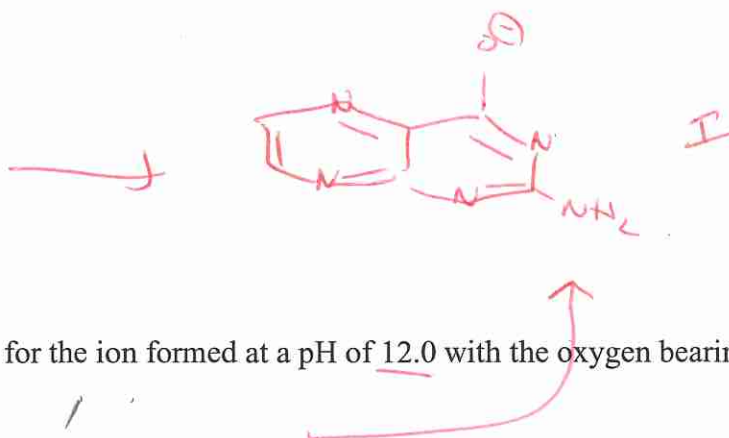
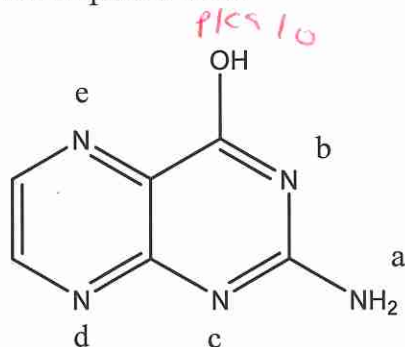
histamine  $C_5H_9N_3$  111 g/mole

$$5 \times 111 = 555 \text{ g}$$

$$\frac{555 \text{ g}}{1000 \text{ mL}} = \frac{x}{300 \text{ mL}} \quad x = 166.5$$

166.55 g  
histamine in  
300 mL of  $H_2O$

7) Given below is the molecule Pterin. Answer the following questions about Pterin. The phenol's  $pK_a$  is 10 while amine a's conjugate acid's  $pK_a$  is 4.6 and any other amine's conjugate acid's  $pK_a$  is 5.25.

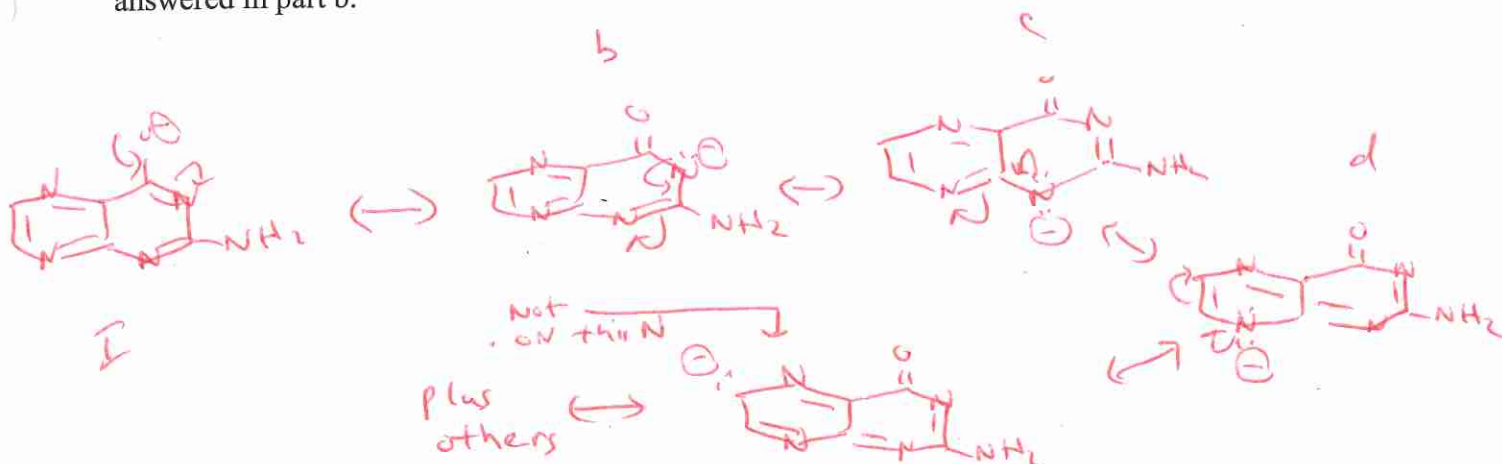


a) Give the resonance contributor for the ion formed at a pH of 12.0 with the oxygen bearing the charge.

b) Which of the other nitrogens can the charge be shared?

b, c, or d

c) Show the resonance structures for ALL of the conjugate base ions of pterin that you answered in part b.



8) Bioluminescence in fireflies is a result of the conversion of chemical energy (in ATP) to light energy. Specifically, ATP,  $O_2$ , and enzyme luciferase cause luciferin (~ 9 mg can be collected from about 15,000 fireflies) to be oxidatively decarboxylated to an electronically excited oxyluciferin. Relaxation of the latter to its ground state is accompanied by the emission of light. Draw the two resonance structures of the conjugate base of oxyluciferin in which either oxygen bears the negative charge. (5 pts.)

