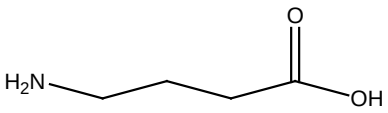
Organic 211 Test # 1 September 11, 2018

Name:_____

Directions: The test is worth 106 points but is scored out of 100.

1) Given below is gamma aminobutyric acid. Answer the following questions for GABA. (3 pts. each)

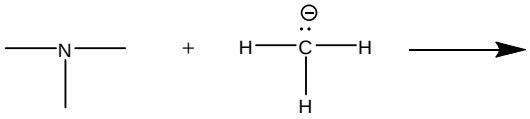


a) Draw the major form present at a pH of 1. b) Draw the major form present at a pH of 7.

c) Draw the major form present at a pH of 9.5.

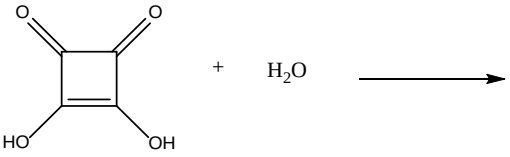
2) For the following Bronsted/Lowry acid-base reactions, give the conjugate acid/conjugate base of the following reactions. Indicate if Keq is greater or less than 1 for b and c. H_3O^+ has a pKa of -1.7.

a) (2 pts.)

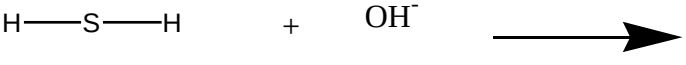


b) (3 pts.)

c) (3 pts.)



d) (3 pts.)



3) a) Squaric acid (shown in 2c above) is not a carboxylic acid but is very acidic (pKa 1.2). Give an explanation as to why you think it is acidic.(4 pts.)

b) Write a Lewis formula for the other conjugate base of squaric acid not shown in 2c, and, using curved arrows, show how the negative charge is shared by two oxygens. (3 pts.)

4) For the molecular formula, C_3H_4, answer the following questions. (3 pts. each)

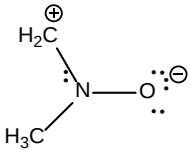
a) Draw a molecule that has an sp^3 carbon and an sp carbon.

b) Draw a molecule that has an sp carbon and two sp^2 carbons.

c) Draw a molecule that does NOT have an sp carbon.

5) Give the electronic configuration of Ruthenium(0). Use of the noble gas configuration is allowed. (5 pts.)

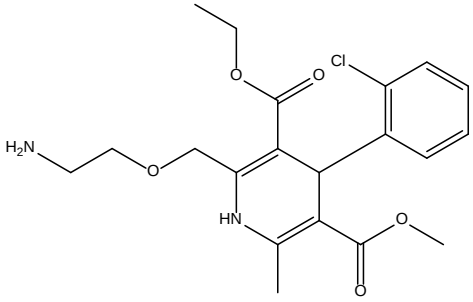
6) a) Draw the remaining (if any) resonance structures for the following ion. (3 pts. each)



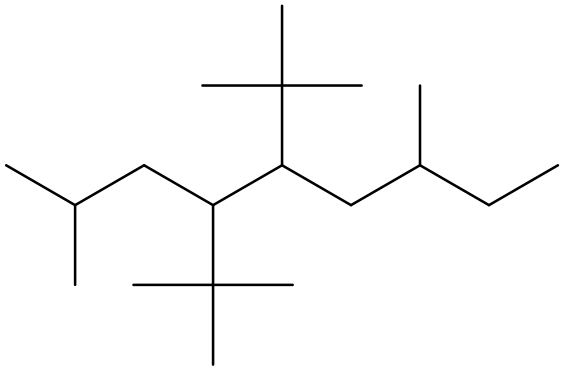
b) Indicate which resonance contributor is most stable and explain your answer.

c) Using curved arrows, show the electron movement that connects the three resonance contributors.

7) Identify 5 functional groups in amlodipine. (5 pts.)



8) Give the name for the molecule below. (5 pts.)



9) a) Calculate the degrees of unsaturation in a molecule with a molecular formula of $C_9H_{13}BrClFN_2O_2S$. Show you work. (4 pts. each)

b) Draw a molecule that has the molecular formula in a.

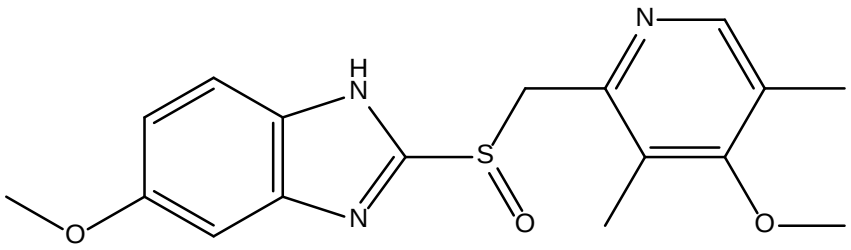
10) Describe how you would make 250 mLs of a 1.00 M solution of NaCN in water. SHOW YOUR WORK! (6 pts.)

11) Write an equation for the Lewis acid/Lewis base reaction between boron trifluoride and dimethylsulfide [$(CH_3)_2S$]. Use curved arrows to track the flow of electrons and show formal charges if present. (5 pts.)

12) Rank the following in order of decreasing concentration in a solution prepared by dissolving 1.0 mol of sulfuric acid in enough water to give 1.0 L of solution. (It is not necessary to do any calculations.) (5 pts.)

H_2SO4 HSO_4^- SO_4^{-2} H_3O^+

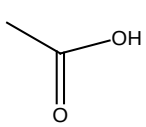
13) For Omeprazole below, put the number of atoms that meet the criteria into the blank. Do not include the S atom in your answers. (5 pts.)



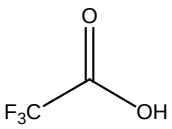
_____ sp^3 atoms _____ sp^2 atoms _____ sp atoms

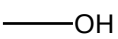
_____ sp^3d atoms

14) Put the following compounds in order from 1= most acidic to 5 = least acidic. (5 pts.)



HBr HCl





15) Give the atomic symbol for the element with 30 protons, 35 neutrons, and 29 electrons. (4 pts.)

16) Give the Lewis dot structure for nitrate if the nitrogen is bound to three oxygens and the nitrate has a negative two charge. (NO_3^{-2}). Show the formal charge. (4 pts.)

17) Free Question: Give something you studied that was not asked on this test. (3 pts.)