Names of all students (please print) _____

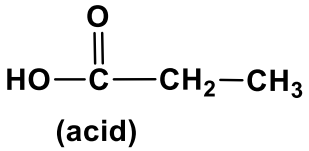
_____

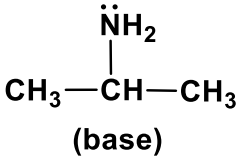
CHEM 243 Organic Chemistry I **Points_____ (10 max)**

Worksheet #4: September 18, 2024. Complete the following worksheet by collaborating with a group of 3-4 students. You can use a text book or your lecture video notes. You must work together, with the names of all students included on **ONE** sheet and turned in for a group grade.

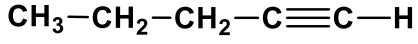
Please join your assigned work group!

(1) Acids and Bases. For each acid draw the conjugate base, and for each base draw the conjugate acid. **Be sure to use appropriate formal charges in the conjugates (if needed).**

(a)  (acid) **conjugate base:**

(b)  (base) **conjugate acid:**

(c) HSO_4^- conjugate acid:
(base)

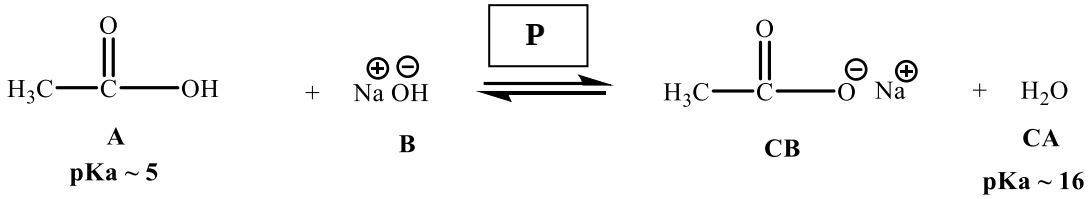
(d)  (acid) **conjugate base:**

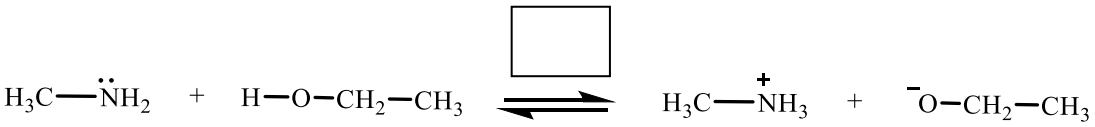
(2) Acids, Bases, and pKa's. Use the pKa Table to look up the <u>approximate</u> pKa values for each acid given below. Then, rank these compounds based on increasing acid strength, with 1 = weakest acid and 5 = strongest acid.

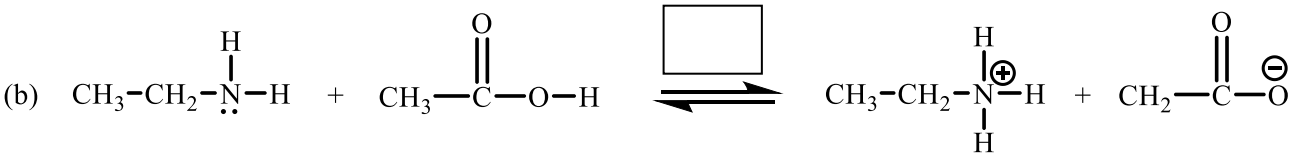
	CH_3-OH	HBr	CH_3-NH_2	$HC\equiv CH$	$CH_3-\overset{\oplus}{N}H_3$
approx. pKa values:	_____	_____	_____	_____	_____
Ranking:	_____	_____	_____	_____	_____

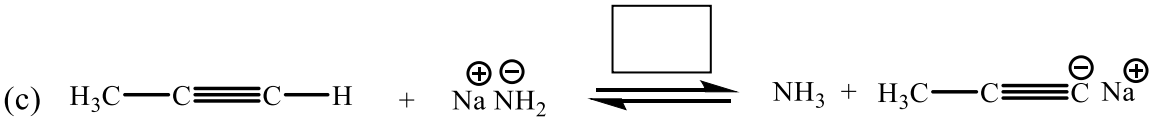
(3) Acids, Bases, Conjugate Acids, Conjugate Bases, and pKa's. What follows is a series of acid-base reactions. Although I expect that you should be able to identify the more common acids and bases, in some cases I have placed lone pairs on the base. For each acid/base reaction shown below, do the following:

(i) Label the acid (A) and base (B) reactants, and label the conjugate acid (CA) and conjugate base (CB) products;
(ii) Using the pKa table, label each acid (A) and conjugate acid (CA) with their approximate pKa's.
(iii) Based on the pKa values, in the box indicate whether the equilibrium favors the Reactants (R) or Products (P).

Example: 

(a) 

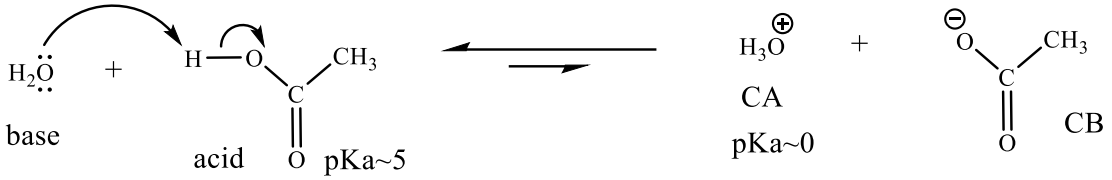
(b) 

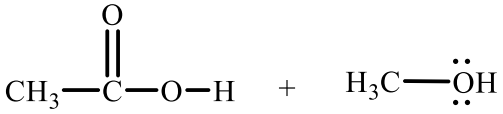
(c) 

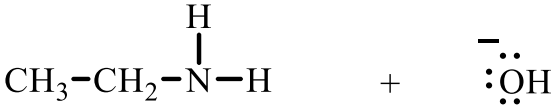
(4) Acid/Base Mechanisms. Complete each organic acid/base reaction shown below by:

- Identifying and labeling the acid and base reactants;
- Using curved arrows to indicate the base "grabbing" the acidic "H" from the acid;
- Drawing the structure of and labeling the <u>conjugate</u> acid and base;
- Assigning appropriate pKa values to the acid species in the reactants and products;
- Drawing equilibrium arrows that <u>clearly</u> show in which <u>direction</u> the reaction is favored.

Example:



(a) 

(b) 

(c)