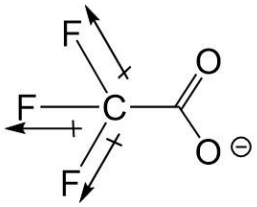
Chapter 16 Worksheet 4 (organic acid-base, pH of salts)

Name: _____ UGA ID: _____

Instructions:

- Please enter your first and last name as it appears on the eLC roster (do not use a nickname).
- Your UGA myID is a combination of letters and numbers (example: mine is sre13137). **Do not use your 81x number.**
- If you do not have a printer, type your answers in the then upload the worksheet template to Gradescope by Monday, November 2 at 11:59 pm. Write your work on separate sheets of paper, convert to a PDF and upload to eLC.
- If you have a printer download the worksheet, convert it to a PDF and upload to Gradescope by Monday, November 2 at 11:59 pm. You do not need to upload anything to eLC.

1. Inductive withdrawal of electron density (as shown below) has what effect on the negative charge?



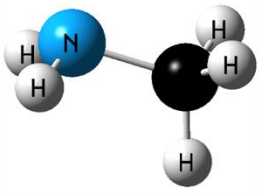
A) It's a bad thing (destabilizing) for the negative charge.

B) It's a good thing (stabilizing) for the negative charge.

C) It has no effect on the negative charge.

2. Which of the following would you expect to be the most basic amine?

A.



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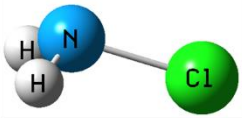

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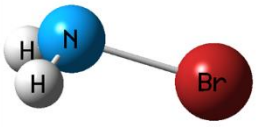
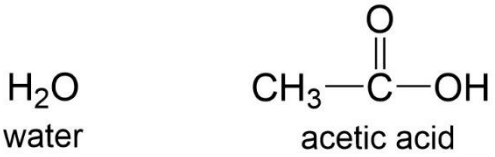


D.

3.

Which is the stronger acid? Explain briefly.



A) Because this is more stable: $H-O^{\ominus}$
water is the **stronger** acid.

B) Because this is more stable: $H-O-H$
water is the **weaker** acid.

C) Because this is more stable: $CH_3-\overset{O}{\overset{\|}{C}}-O^{\ominus}$
acetic acid is the **stronger** acid.

D) Because this is more stable: $CH_3-\overset{O}{\overset{\|}{C}}-OH$
acetic acid is the **weaker** acid.

E) It's impossible to predict acid strength without pK_a data.

4. Choose the correct conjugate acid or base for each compound.

	conjugate base of NH_3	conjugate acid of H_2O	conjugate acid of $H:^{\ominus}$
A)	$NH_2^{\ominus}$	$H_3O^{\oplus}$	H_2O
B)	$NH_4^{\oplus}$	$OH^{\ominus}$	H_2O
C)	$NH_2^{\ominus}$	$OH^{\ominus}$	H_2
D)	$NH_2^{\ominus}$	$H_3O^{\oplus}$	H_2
E)	$NH_4^{\oplus}$	$:OH^{\ominus}$	H_2

5. KCN is

A. Acidic B. Basic C. Neutral

The $[OH^-]$ in a 0.5 M aqueous solution of this salt is obtained by solving

A. $\frac{x2}{0.5\ M - x}$ = K_a (K^+)

B. $\frac{x2}{0.5\ M - x}$ = K_a (HCN)

C. $\frac{x2}{0.5\ M - x}$ = K_b (KOH)

D. $\frac{x2}{0.5\ M - x}$ = K_b (CN^-)

6. Which statement is true about acids and bases? Select all that apply.

A. All acids and bases can be classified as Lewis acids or bases

B. All acids are proton donors

C. All bases are proton acceptors

D. All hydroxide salts are strong bases

E. All hydrogens in a compound can be acidic in aqueous solution

F. None of these statements are true

7. From the following chemical reactions determine the relative Brønsted-Lowry acid strengths (strongest to weakest).

$HCl(aq) + H_2O(l) \rightarrow H_3O^+(aq) + Cl^-(aq)$

$HCN(aq) + H_2O(l) \rightleftharpoons H_3O^+(aq) + CN^-(aq)$

A. HCl > HCN > H_3O^+

B. HCl > H_3O^+ > HCN

C. H_3O^+ > HCl > HCN

D. HCN > H_3O^+ > HCl

8. Find the pH of a 0.250 M sodium acetate solution. K_a acetic acid = 1.8×10^{-5}

9. Determine whether aqueous solutions of the salts below are acidic (a), basic (b) or neutral (n).

K_a H_2CO_3 = 4.27×10^{-7}

K_b NH_3 = 1.8×10^{-5}

K_a HCO_3^- = 4.8×10^{-11}

K_a $H_2PO_4^-$ = 6.31×10^{-8}

K_a HPO_4^{2-} = 4.47×10^{-13}

K_a H_3PO_4 = 7.08×10^{-3}

A. K_2CO_3

B. $CaCl_2$

C. KH_2PO_4

D. $(NH_4)_2CO_3$

10. Determine whether an aqueous solution of Na_2HPO_4 is

A. Acidic

B. Basic

C. Neutral

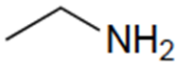
K_a $H_2PO_4^-$ = 6.31×10^{-8}

K_a HPO_4^{2-} = 4.47×10^{-13}

K_a H_3PO_4 = 7.08×10^{-3}

11. Rank these compounds in terms of increasing acidity:

A.



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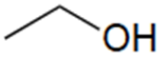

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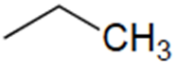

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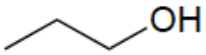

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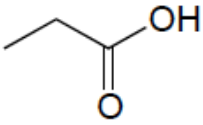

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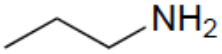

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