

Name _____

Block: _____ Date: _____

Chemistry 12
HYDROLYSIS



1. Write dissociation equations for each of the following salts, state whether cation hydrolyzes, anion hydrolyzes and whether the salt is acidic, basic or neutral.



Cation (Acid or Neutral) N Anion (Base or Neutral) B

Is salt acidic, basic or neutral? basic



Cation (Acid or Neutral) A Anion (Base or Neutral) N

Is salt acidic, basic or neutral? acidic



Cation (Acid or Neutral) A Anion (Base or Neutral) N ↑ from strong acid

Is salt acidic, basic or neutral? acidic



Cation (Acid or Neutral) N Anion (Base or Neutral) N

Is salt acidic, basic or neutral? neutral



Cation (Acid or Neutral) A Anion (Base or Neutral) N

Is salt acidic, basic or neutral? acidic

2. State whether each of the following substances are acidic, basic or neutral when mixed with water.

a) RbNO_3 N

b) NH_4Br A

c) H_2SO_4 A

d) KNO_2 B

e) NH_4NO_3 A

f) NaOH C

g) NH_3 B

h) LiCH_3COO B

i) H_3PO_4 A

j) CH_3COOH A

k) FeBr_3 A

l) $\text{Ba}(\text{OH})_2$ B

3. Of the following, circle the one with the *highest* pH:

- a) i) NH_4^+ ii) HF iii) NH_3 iv) CH_3COOH v) HCl

- b) i) PO_4^{3-} ii) SO_3^{2-} iii) Al^{3+} iv) CH_3COO^- v) Cl^-

- c) i) NaCl ii) CrCl_3 iii) NH_4I iv) CH_3COOH v) H_2S

4. Of the following, circle the one with the *lowest* pH:

- a) i) NH_4^+ ii) HF iii) NH_3 iv) CH_3COOH v) HCl

- b) i) PO_4^{3-} ii) SO_3^{2-} iii) Al^{3+} iv) CH_3COO^- v) Cl^-

- c) i) NaCl ii) KCN iii) NH_3 iv) Na_2CO_3 v) $\text{Li}_2\text{C}_2\text{O}_4$

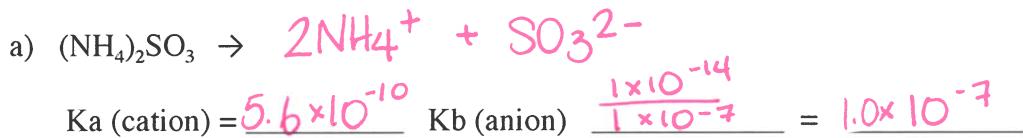
5. Find K_a and K_b of each of the following amphiprotic anions and determine if they act as an acid or a base in water solution. (9 marks)

a) HPO_4^{2-} $K_a = 2.2 \times 10^{-13}$ $K_b = 1.6 \times 10^{-7}$ A or B base

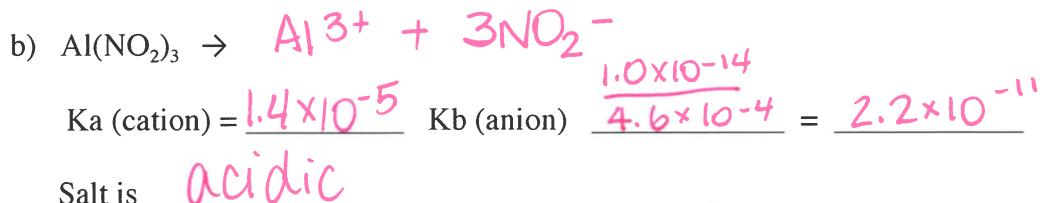
b) $\text{HC}_6\text{H}_5\text{O}_7^{2-}$ $K_a = 4.1 \times 10^{-7}$ $K_b = 5.9 \times 10^{-10}$ A or B acid

c) HSO_4^- $K_a = 1.2 \times 10^{-2}$ $K_b = \text{V.small}$ A or B acid

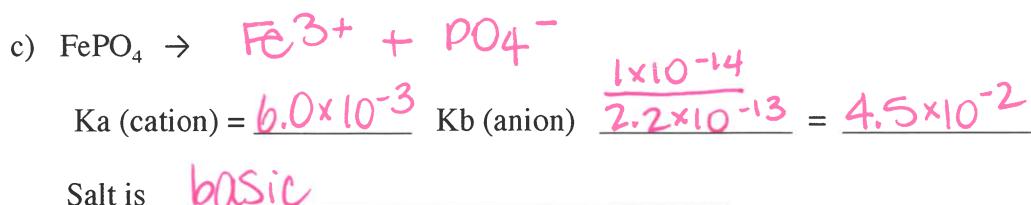
6. Write the dissociation equations for each of the following. Determine the K_a for the cation and the K_b for the anion and state whether the salt acts as an acid or a base in water.



Salt is basic



Salt is acidic

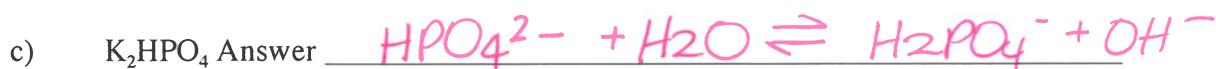


Salt is basic

$K_b = \frac{1 \times 10^{-14}}{K_a (\text{conjugate acid})}$

7. Define **hydrolysis**. *the reaction of a salt (or ion) with water to produce H_3O^+ or OH^-*

8. Write the net ionic equation for the **predominant hydrolysis reaction** when each of the following salts is dissolved in water. For some questions, calculations may be needed.



9. Use a hydrolysis equation to explain why phosphates (PO_4^{3-}) are used as cleaning agents.



Explanation: *OH^- (base) is produced
 \Rightarrow dissolves grease & proteins
 base + fat \rightarrow soap + glycerol*