

CHM 130: Homework 9

- 1) Using your knowledge of the Brønsted-Lowry theory of acids and bases, write equations for the following acid-base reactions and indicate each conjugate acid-base pair:
 - a) $\text{HNO}_3 + \text{OH}^- \rightarrow$
 - b) $\text{CH}_3\text{NH}_2 + \text{H}_2\text{O} \rightarrow$
 - c) $\text{OH}^- + \text{HPO}_4^{2-} \rightarrow$
- 2) The compound NaOH is a base by the theories we discussed in class. However, each of the theories describes what a base is in different terms. Use your knowledge of these theories to describe NaOH as an Arrhenius base, and a Brønsted-Lowry base.
- 3) When hydrogen chloride reacts with ammonia, ammonium chloride is formed. Write the equation for this process, and indicate which of the reagents is the Brønsted-Lowry acid and which is the base.

4) Write an equation for the reaction of aluminum hydroxide with hydrochloric acid.

5) In the reaction above, what is the name of the salt made in the reaction?

6) Write the names for the following acids and bases:

a) KOH _____

b) H₂Se _____

c) C₂H₃O₂H _____

d) Fe(OH)₂ _____

e) HCN _____

7) Write the formulas for the following chemical compounds (remember, you've still got a pop quiz coming up before the end of next week!)

a) ammonium sulfate _____

b) cobalt (III) nitride _____

c) carbon disulfide _____

d) aluminum carbonate _____

e) chlorine _____

8) What is the pH and pOH of a 1.2×10^{-3} HBr solution?

9) What is the pH and pOH of a 2.34×10^{-5} NaOH solution?

Classify as an acid or a base

10. Taste bitter _____

11. Taste Sour _____

12. Feels slimy or slippery _____

13. Turns litmus paper blue _____

14. Turns litmus paper red _____

15. Gives off hydrogen gas when it reacts with some metals

16) HNO_3 is an Arrhenius _____ and increases the concentration of _____ when added to water.

17) $\text{Ca}(\text{OH})_2$ is an Arrhenius _____ and increases the concentration of _____ when added to water.

18) For this reaction: $\text{H}_2\text{SO}_4 + \text{NH}_3 \rightarrow \text{HSO}_4^- + \text{NH}_4^+$

H_2SO_4 goes to HSO_4^-

- a) Did it gain or lose a proton? _____
b) Is it a Brønsted -Lowery acid or base? _____

NH_3 goes to NH_4^+

- a) Did it gain or lose a proton? _____
b) Is it a Brønsted -Lowery acid or base? _____

The following are Brønsted -Lowery acids. Determine what will form when each donates a proton (forms its conjugate base)

- 19) HI
20) HCO_3^-
21) H_2O
22) NH_4^+
23) HClO_3

The following are Brønsted -Lowery bases. Determine what will form when each accepts a proton (forms its conjugate acid)

- 24) CN^-
25) HCO_3^-
26) H_2O
27) NO_3^-
28) SO_4^{2-}

- 29) What is a strong acid?

- 30) What is a weak acid?
- 31) What is a strong base?
- 32) What is a weak base?
- 33) What is a buffer?
- 34) What does a buffer do?
- 35) Give 3 examples of buffer systems (what the acid and salt are)
- 36) What is the pH of blood and what are the buffer systems that maintain its pH?
- 37) What happens if the pH of blood is greater than 7.4?
- 38) If the pH of a solution is 5, what is its pOH?
- 39) What can be said about the values of K_a for all weak acids?
- 40) What is pH of 0.0054 M NaOH?