Topic 8.1, 8.2 Worksheet

1. Write one equation that can be used to calculate …

   a. the pH of a solution if $[H_3O^+]$ is known.

   b. the pOH of a solution if $[OH^-]$ is known.

   c. the pH of a solution if $[OH^-]$ is known.

   d. the pOH of a solution if $[H_3O^+]$ is known.

   e. the pH of a solution if pOH is known.

   f. the $[H_3O^+]$ if pH is known.

   g. the $[OH^-]$ if pOH is known.

   h. the $[H_3O^+]$ if $[OH^-]$ is known.

$$5\ H_2O_2(aq) + 2\ MnO_4^-(aq) + 6\ H^+(aq) \rightarrow 2\ Mn^{2+}(aq) + 8\ H_2O(l) + 5\ O_2(g)$$

2. Does the pH of the solution in the reaction above increase, decrease, or remain the same as the reaction proceeds? Justify your answer.

3. A neutral solution of water, with pH = 7.00, is heated to 50 ℃ and the pH drops to 6.63.
   a. Did the ionization of water increase or decrease with an increase in temperature? Justify your answer.

   b. What is the $[H_3O^+]$?

   c. What is the $[OH^-]$?

   d. Calculate the value of K_w at 50 ℃.

   e. Is the solution still neutral? Justify your answer.

   f. Does the value of K_w increase or decrease with an increase in temperature?

g. Does the value of pK_w increase or decrease with an increase in temperature?

4. By what factor must a solution of a strong acid be diluted to increase the pH by 1? Give an example to justify your answer.

5. What are the formulas and names of the six strong acids?

6. What physical property of an acid makes it a strong acid?

7. What is the general formula of a strong base?

8. What physical property of a base makes it a strong base?

9. Give the reaction of HCl(aq) dissolved in water.

10. Calculate the pH of the strong acids and bases given below:
    a. A 0.002 M solution of HCl

    b. A 3.45×10^{-4} M solution of HNO_3

    c. A solution made by dissolving 3.2 g of KOH into 450 mL of total solution.

d. 100 mL of a 1 x 10^{-4} M HBr solution.

e. The solution from d that is diluted to a total volume of 1000 mL.

f. 100 mL of a 0.10 M HNO_3 solution added to 100 mL of 0.25 M HCl and diluted to a final volume of 1200 mL.

g. A solution of $Ca(OH)_2$ made by dissolving 120. g in 3500 mL of total solution.

11. Complete the following table without a calculator. Then check your work with a calculator.

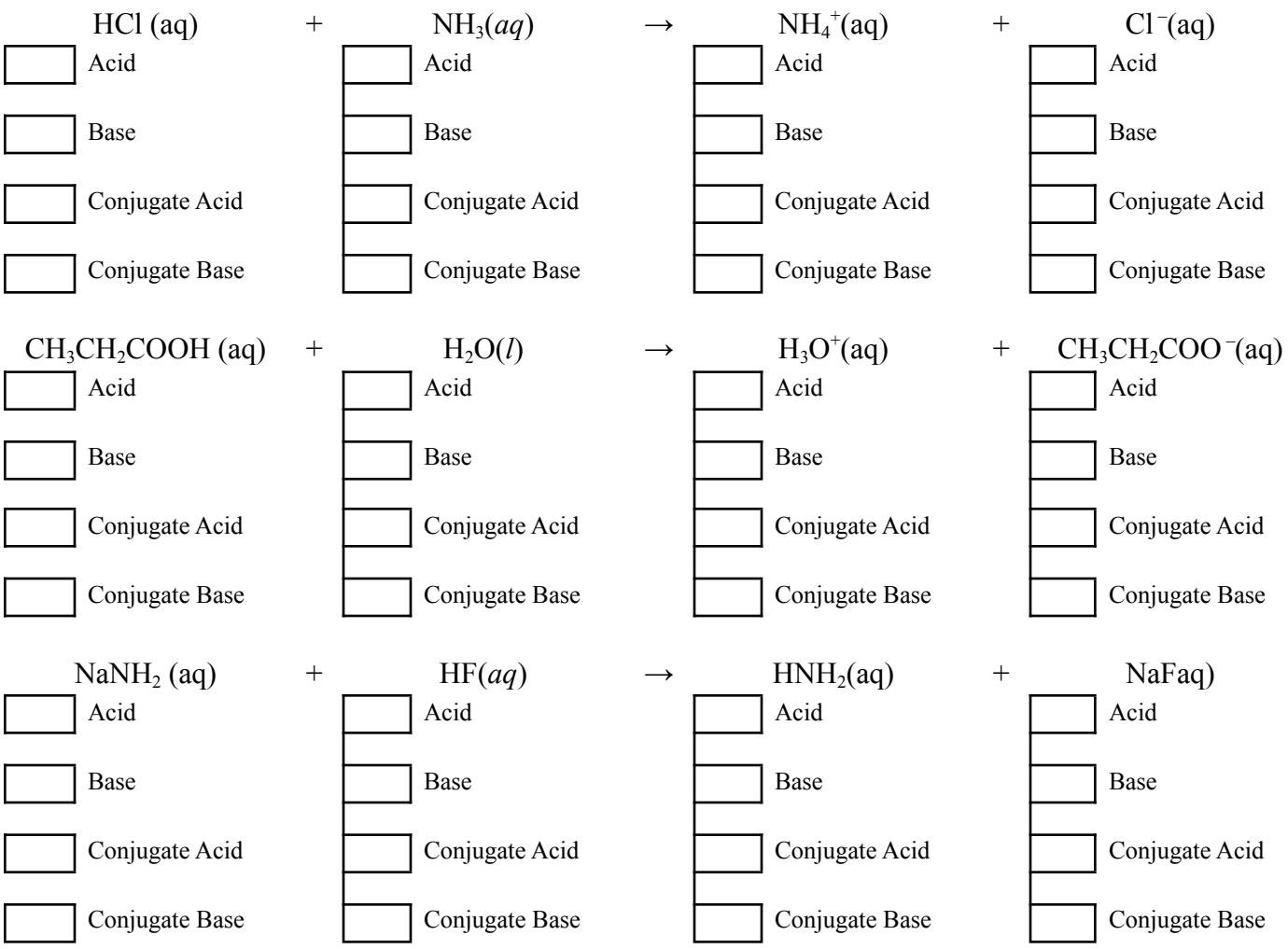
$[H^+]$ or $[OH^-]$	pH between …	
	1 to 2	2 to 3
$[H^+] = 1.25 \times 10^{-2}$ M	3 to 4	4 to 5
	5 to 6	6 to 7

	1 to 2	2 to 3
$[H^+] = 4.56 \times 10^{-4}$ M	3 to 4	4 to 5
	5 to 6	6 to 7

	1 to 2	2 to 3
$[OH^-] = 7.88 \times 10^{-11}$	3 to 4	4 to 5

	5 to 6	6 to 7

12. Identify the acid, base, conjugate acid, and conjugate base in the following reactions.



13. For the acid, give the conjugate base. For the base, give the conjugate acid.

Acid	Conjugate Base	Base	Conjugate Acid
$HC_2H_3O_2$		CH_3NH_2	
HF		C_5H_5N	
C_5H_5COOH		H_2O	