

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Chemistry**  
**Acids & Bases WS 3 – pH**

I. *Showing all work, calculate the pH from the following hydrogen ion concentrations and state whether each solution is an acid, a base, or neutral.*

1.  $[H^+] = 1.0 \times 10^{-3} \text{ M}$

2.  $[H^+] = 2.4 \times 10^{-5} \text{ M}$

3.  $[H^+] = 5.11 \times 10^{-13} \text{ M}$

4.  $[H^+] = 7.352 \times 10^{-2} \text{ M}$

5.  $[H^+] = 3.5 \times 10^{-6} \text{ M}$

6.  $[H^+] = 1.0 \times 10^{-7} \text{ M}$

7.  $[H^+] = 6.85 \times 10^{-10} \text{ M}$

8.  $[H^+] = 4.99 \times 10^{-8} \text{ M}$

9.  $[H^+] = 3.389 \times 10^{-1} \text{ M}$

II. *Showing all work, calculate the hydrogen ion concentrations from the following pHs and state whether each solution is an acid, a base, or neutral.*

10. 6.3

11. 8.17

12. 3.50

13. 7.00

14. 13.22

15. 7.98

16. 11.61

17. 1.671

18. 5.250

## Questions

- For each of the following concentrations of  $[H^+]$ , calculate the pH:
  - $3.28 \times 10^{-4}$
  - $9.43 \times 10^{-13}$
  - $2.71 \times 10^{-8}$
  - $1.00 \times 10^{-3}$
  - $1.00 \times 10^{-12}$
- For each of the following pH values, calculate the concentration of  $[H^+]$ :
  - pH = 5
  - pH = 3
  - pH = 2.8
  - pH = 13.7
  - pH = 6.9
- For each of the following pOH values, determine whether the solution is acidic, basic, or neutral:
  - pOH = 4.5
  - pOH = 9.2
  - pOH = 7
  - pOH = 13.8
  - pOH = 0.4
- For each of the following concentrations of  $[OH^-]$ , calculate pOH:
  - $6.32 \times 10^{-2}$
  - $9.28 \times 10^{-9}$
  - $7.56 \times 10^{-3}$
  - $1.00 \times 10^{-5}$
  - $1.00 \times 10^{-11}$
- For each of the following pOH values, calculate the concentration of  $[OH^-]$ :
  - pOH = 3.5
  - pOH = 9.1
  - pOH = 4.6
  - pOH = 2.4
  - pOH = 7.0
- Using the pH square, fill in the blanks on the following chart:

$[H^+]$	pH	pOH	$[OH^-]$
$1.0 \times 10^{-4}$			
	3.9		
		1.2	
			$8.3 \times 10^{-8}$

# pH AND pOH

Name \_\_\_\_\_

The pH of a solution indicates how acidic or basic that solution is.

pH range of 0 - 7 acidic

7 neutral

7-14 basic

Since  $[H^+][OH^-] = 10^{-14}$  at  $25^\circ C$ , if  $[H^+]$  is known, the  $[OH^-]$  can be calculated and vice versa.

$pH = -\log [H^+]$       So if  $[H^+] = 10^{-6} M$ ,  $pH = 6$ .

$pOH = -\log [OH^-]$       So if  $[OH^-] = 10^{-8} M$ ,  $pOH = 8$ .

Together,  $pH + pOH = 14$ .

Complete the following chart.

	$[H^+]$	pH	$[OH^-]$	pOH	Acidic or Basic
1.	$10^{-5} M$	5	$10^{-9} M$	9	Acidic
2.		7			
3.			$10^{-4} M$		
4.	$10^{-2} M$				
5.				11	
6.		12			
7.			$10^{-5} M$		
8.	$10^{-11} M$				
9.				13	
10.		6			

# pH AND pOH CONTINUED

Name \_\_\_\_\_

Calculate the pH of the solutions below.

1. 0.01 M HCl

2. 0.0010 M NaOH

3. 0.050 M  $\text{Ca}(\text{OH})_2$

4. 0.030 M HBr

5. 0.150 M KOH

6. 2.0 M  $\text{HC}_2\text{H}_3\text{O}_2$  (Assume 5.0% dissociation.)

7. 3.0 M HF (Assume 10.0% dissociation.)

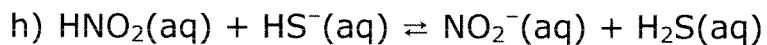
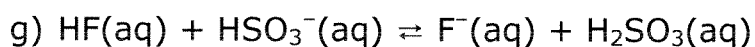
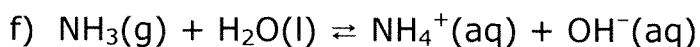
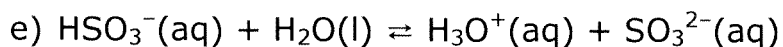
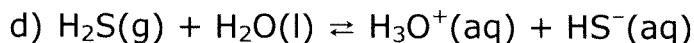
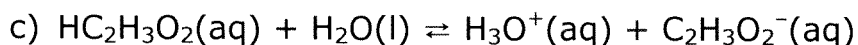
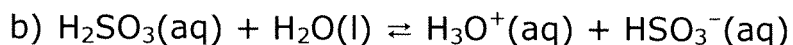
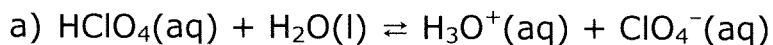
8. 0.50 M  $\text{HNO}_3$

9. 2.50 M  $\text{NH}_4\text{OH}$  (Assume 5.00% dissociation.)

10. 5.0 M  $\text{HNO}_2$  (Assume 1.0% dissociation.)

## Conjugate Pairs Practice Questions

1. Identify the acid, base, conjugate acid and conjugate base for each of the following.



2. Complete the equation for the reaction of each of the following with water. Indicate whether the ion or molecule is an acid or base, and whether each reaction is explained by Arrhenius, Bronsted-Lowry, or both.

