

All questions are worth 1 point unless otherwise marked.

1. What were the names of the people who gave us the 2 different scientific definitions of acids and bases.
2. How would you define an acid and a base according to the first person(s) you mentioned in question #1?
  - a. Acid-
  - b. Base-
3. How would you define an acid and a base according to the other person(s) you mentioned in question #1?
  - a. Acid-
  - b. Base-
4. Before scientists described acids and bases by the above means, how did we identify acids and bases?
  - a. Acids-
  - b. Bases-
5. A base has to \_\_\_\_\_ to become a conjugate acid.
6. An acid has to \_\_\_\_\_ to become a conjugate base.

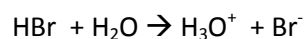
7. Which of the following pairs is a correct acid, conjugate base pair?

- a.  $\text{KNO}_3, \text{NaNO}_3$
- b.  $\text{H}_2\text{O}, \text{HF}$
- c.  $\text{HCl}, \text{Cl}^-$

8. Which of the following pairs is a correct base, conjugate acid pair?

- a.  $\text{NH}_3, \text{NH}_4^+$
- b.  $\text{HF}, \text{SF}_6$
- c.  $\text{NaCl}, \text{HCl}$

9. In the following equation, identify the acid, base, conjugate acid and conjugate base:



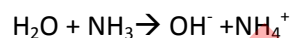
Base \_\_\_\_\_

Conjugate Base \_\_\_\_\_

Acid \_\_\_\_\_

Conjugate Acid \_\_\_\_\_

10. In the following equation, identify the acid, base, conjugate acid and conjugate base:



Base \_\_\_\_\_

Conjugate Base \_\_\_\_\_

Acid \_\_\_\_\_

Conjugate Acid \_\_\_\_\_

11. Write the conjugate acid for  $\text{Cl}^-$ :

12. Write the conjugate base for  $\text{HPO}_4^{2-}$ :

13. Write the conjugate acid for  $\text{SO}_3^{2-}$ :

14. Write the conjugate base for  $\text{NH}_3$ :

15. Define "AMPHOTERIC" .

16. Define "ACIDIC" with regard to solutions. You may use words or a math expression.

17. Define " NEUTRAL" with regard to solutions. You may use words or a math expression.

18. Define "BASIC" with regard to solutions. You may use words or a math expression.

19. Write the equation for the ionization of water (water reacting with itself).

20. The pH scale uses what type of mathematical operation?

21. What base number is used for the pH scale math operation?

**Answer each question. All questions worth 3 points.**

22. If the  $[H^+] = 1 \times 10^{-5} M$  what is the  $[OH^-]$  in the solution? Is the solution Acidic, Basic or Neutral?

23. If the  $[H^+] = 0.00052 M$  what is the  $[OH^-]$  in the solution? Is the solution Acidic, Basic or Neutral?

24. If the  $[OH^-] = 0.0000001 M$  what is the  $[H^+]$  in the solution? Is the solution Acidic, Basic or Neutral?

**Answer each question. All questions worth 2 points.**

25. What is the pH of a solution with a  $[H^+] = 0.049 M$ ?

26. What is the pOH of a solution with a  $[OH^-] = 1.8 \times 10^{-11} M$ ?

27. What is the pH of a solution with a pOH of 11.80?

28. What is the pOH of a solution with a  $[H^+]$  of  $4.10 \times 10^{-8} M$ ?

29. What is the pH of a 0.078 M solution of HCl (a strong acid)?

30. If the  $[H^+] = 0.890 \text{ M}$  what is the  $[OH^-]$  in the solution? Is the solution Acidic, Basic or Neutral?

31. If the  $[H^+] = 1 \times 10^{-7} \text{ M}$  what is the  $[OH^-]$  in the solution? Is the solution Acidic, Basic or Neutral?

32. If the  $[OH^-] = 1.2 \text{ M}$  what is the  $[H^+]$  in the solution? Is the solution Acidic, Basic or Neutral?

**Answer each question. All questions worth 2 points.**

33. What is the pH of a solution with a  $[H^+] = 1.9 \text{ M}$ ?

34. What is the pOH of a solution with a  $[OH^-] = 0.198 \text{ M}$ ?

35. What is the pOH of a solution with a pH of 2.91?

36. What is the pH of a solution with a  $[OH^-]$  of  $1.450 \times 10^{-2} \text{ M}$ ?

37. What is the pH of a 0.005M solution of HCl (a strong acid)?