

General Chemistry
Mr. MacGillivray
Worksheet: Acids & Bases, Part I

1. Answer these questions about acids. All solutions are aqueous solutions at 25°C.
 - a. What is the name for the H_3O^+ ion?
 - b. What is always true about $[\text{H}_3\text{O}^+]$ of acidic solutions? (Is it bigger or smaller than $[\text{OH}^-]$?)
 - c. What is the numerical value of $[\text{H}_3\text{O}^+]$ for an acid? (Give a range.)
 - d. What is the pH range of acids?
 - e. What is the pOH range of acids?
 - f. Explain what is meant by the logarithm of a number.
 - g. What is the formula for calculating pH from $[\text{H}_3\text{O}^+]$?

2. Answer these questions about bases. All solutions are aqueous solutions at 25°C.
 - a. What is the name for the OH^- ion?
 - b. What is always true about $[\text{H}_3\text{O}^+]$ of basic solutions? (Is it bigger or smaller than $[\text{OH}^-]$?)
 - c. What is the numerical value of $[\text{OH}^-]$ for a base? (Give a range.)
 - d. What is the pH range of bases?
 - e. What is the pOH range of bases?
 - f. What is the formula for calculating pOH from $[\text{OH}^-]$?

3. State whether the following statements (about aqueous solutions) are TRUE or FALSE:
 - a. The product of $[\text{OH}^-] \times [\text{H}_3\text{O}^+]$ is equal to 1.00×10^{-14} for a neutral solution.
 - b. The product of $[\text{OH}^-] \times [\text{H}_3\text{O}^+]$ is equal to 1.00×10^{-14} for all solutions.
 - c. $[\text{OH}^-] = [\text{H}_3\text{O}^+]$ for all solutions.
 - d. $[\text{OH}^-] = 1.00 \times 10^{-7}$ for all solutions.

4. Acids are proton (a)_____ and electron pair (b)_____. Acids produce (c)_____ ions in solution.

5. Bases are proton (a)_____ and electron pair (b)_____. Bases produce (c)_____ ions in solution.

6. For the preceding problems you used the (a)_____, (b)_____, and (c)_____ definitions to define acids and bases.

7. Write the chemical reaction between HF acid and water below. Then, label the conjugate acid-base pairs.

8. Write the chemical reaction between the acetate ion (CH_3CO_2^-), a base, and water below. Then, label the conjugate acid-base pairs.

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9. Fill in the missing values in each box.

| Problem | Answer | Problem | Answer |
|---------------|--------|-----------------|--------|
| $10^3 = ?$ | | $10^{-7} = ?$ | |
| $10^2 = 1000$ | | $10^2 = 0.0001$ | |
| $10^{-4} = ?$ | | $10^{-3} = ?$ | |
| $10^2 = 0.1$ | | $10^2 = 0.0368$ | |

10. Solve for the missing values.

| [OH] | [H ₃ O ⁺] | Acidic, Basic, or Neutral Solution | pH | pOH |
|--------------------------------|----------------------------------|--|----|-----|
| $1.0 \times 10^{-7} \text{ M}$ | | | | |
| | $1.0 \times 10^{-9} \text{ M}$ | | | |
| $1.0 \times 10^{-5} \text{ M}$ | | | | |
| | $6.2 \times 10^{-13} \text{ M}$ | | | |
| $9.3 \times 10^{-9} \text{ M}$ | | | | |