

Making Acids and Bases via Combustion

Element Burned	Substance Produced	Litmus test when substance is put in water	Acid or Base	Compound Produced

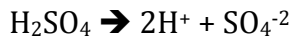
The Relative Strength of Acids and Bases

- Some acids like H_2SO_4 (car battery acid) can burn a hole in your clothing.
– **strong acid**
- Some acids like acetic acid (vinegar) we eat.
– **weak acid**
- Some bases NaOH (toilet bowl cleaners) can burn your skin.
– **strong base**
- Some bases CaCO_3 (antacids) are used to treat upset stomachs.
– **weak base**

The pH Scale

- The **pH scale** is used to measure strength by measuring hydrogen ions (H^+).
- pH scale ranges from 1 to 14
- $\text{pH} = 7$ is neutral
- $\text{pH} = -\log[\text{H}^+]$
- The lower the number, the more H^+ there are in solution.

Recall Dissociation/Ionization:



✓this solution will have a pH from **1 – 6.9 acidic** because there are more H^+ than OH^-

pH = 7 is neutral (same amount of H^+ and OH^-)



✓this solution will have a pH from **7.1 – 14 basic** because there are less H^+ than OH^-

- water is neutral pH=7 since $\text{H}^+ = \text{OH}^-$
- The difference between numbers on the pH scale is a factor of 10.
 - 5 to 4 means it's a stronger acid by a factor of 10
 - 11 to 12 means it's a stronger base by a factor of 10

The strength of pH 4 compared to 6 is _____.

The strength of pH 10 compared to 14 is _____.

The strength of pH 5 compared to 4 is _____.

pH Questions

1. Indicate if the following are acidic, basic or neutral.

- a. pH 5.4
- b. pH 11.5
- c. pH 14
- d. pH 2.1
- e. pH 7
- f. pH 6.7

2. Indicate which of the following is the stronger acid.

- a. pH 4 or pH 2
- b. pH 2 or pH 6.5
- c. pH 7 or pH 5
- d. pH 1.1 or pH 1.2
- e. pH 1 or pH 14

3. Indicate which of the following is the stronger base.

- a. pH 7 or pH 14
- b. pH 11 or pH 10
- c. pH 9 or pH 8.3
- d. pH 13 or pH 13.5
- e. pH 6 or pH 11

4. Compare the strengths using the pH scale.

- a. pH 4 is 100 x stronger than pH 6
- b. pH 5 is _____ x _____ than pH 6
- c. pH 7 is _____ x _____ than pH 4
- d. pH 11 is _____ x _____ than pH 7
- e. pH 3 is _____ x _____ than pH 2
- f. pH 11 is _____ x _____ than pH 13

5. What does the pH scale indicate?

6. Why is water considered neutral?