

# Lesson 15

Chemistry 0

Jan 2022, L. Tracey Gao



## Week 14 HW Review

1. Acidic foods can be identified by what taste?
  - A. sour
  - B. sweet
  - C. salty
  - D. bitter
  
2.  $\text{OH}^-$  is called the \_\_\_\_\_.
  - A. hydrate ion
  - B. hydrogen ion
  - C. hydroxide ion
  - D. None of the above



## Week 14 HW Review

3. Which substance has the lowest pH?
  - A. Milk
  - B. Water
  - C. Bleach
  - D. Lemon juice
  
4. An unknown substance is added to a solution and the pH increases. The substance is \_\_\_\_\_.
  - A. Acidic
  - B. Basic
  - C. Sweet



## Week 14 HW Review

5. What feels slippery?
  - A. Acids
  - B. Bases
  - C. Neutral substances
  
6. Blue litmus paper will turn red in the presence of \_\_\_\_\_.
  - A. Acids
  - B. Bases
  - C. Neutral substances



## Week 14 HW Review

7. pH is less than 7.
  - A. Acids
  - B. Bases
  - C. Neutral substances
  
8. pH can be measured by\_\_\_\_\_.
  - A. pH paper
  - B. pH meters
  - C. Universal acid-base indicators
  - D. All of the above

# Acid-Base Theory

- Swedish Chemist Svante Arrhenius Theory

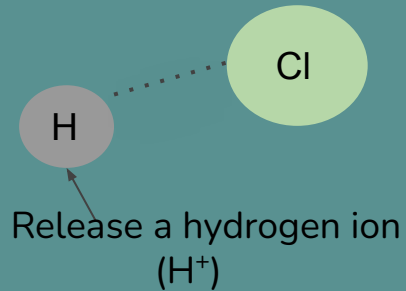
## Arrhenius Acid



(acid)

Example

Hydrogen Chloride (HCl)



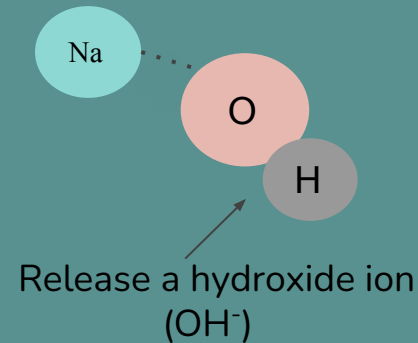
## Arrhenius Base



(base)

Example

Sodium Hydroxide (NaOH)

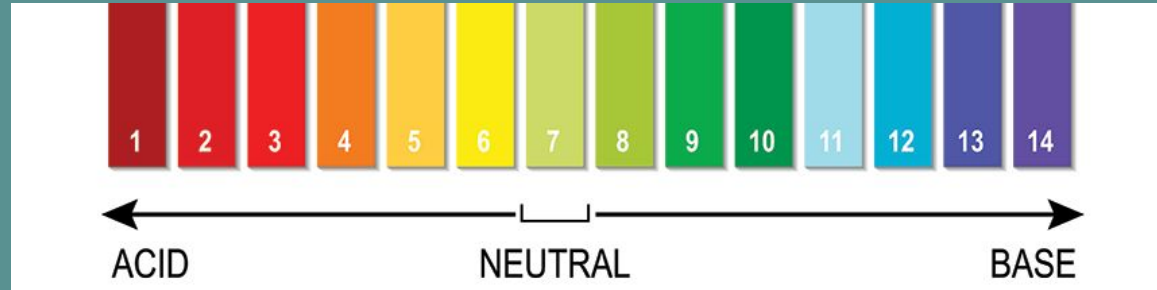




# Acid-Base Neutralization

- pH is a measure of the concentration of hydrogen ions in a solution.
- Adding an acid increases the concentration of hydrogen ions in the solution.
- Adding a base decreases the concentration of hydrogen ions in the solution.
- An acid and a base are like chemical opposites.

# Acid-Base Neutralization



- If a base is added to an acidic solution, the solution becomes less acidic and moves toward the middle of the pH scale. This is called neutralizing the acid.
- If an acid is added to a basic solution, the solution becomes less basic and moves toward the middle of the pH scale. This is called neutralizing the base.



# Acid-Base Neutralization Reaction

When an acid is added to a base, or a base is added to an acid, an acid-base neutralization reaction occurs.

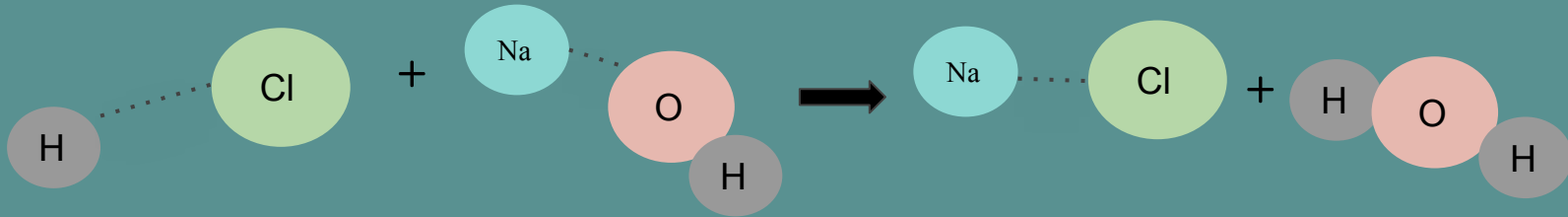
Example 1: hydrochloric acid reacts with sodium hydroxide



# Acid-Base Neutralization Reaction

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Example 1: hydrochloric acid reacts with sodium hydroxide



# Acid-Base Neutralization Reaction

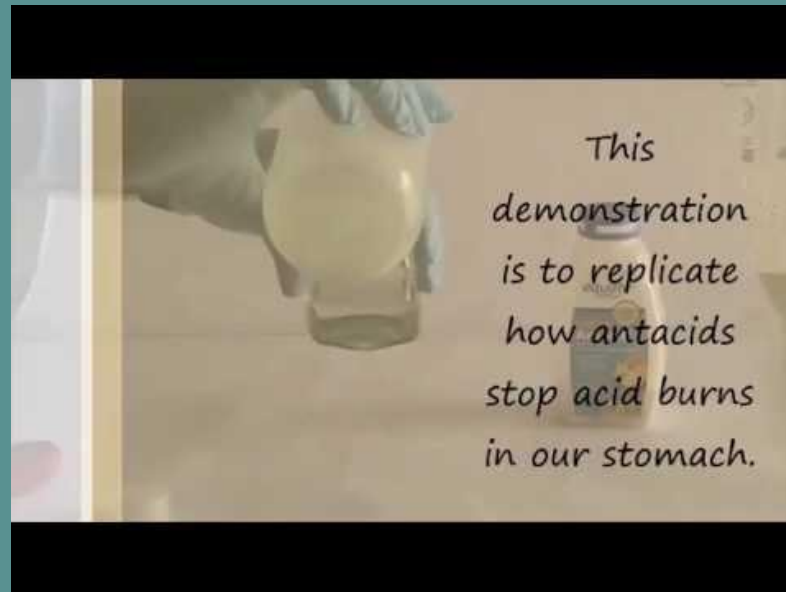
Example 2: antacid tablets reacts with stomach acid



<https://www.tums.com/antacid-products/>

# Acid-Base Neutralization Reaction

Example 2: antacid tablets reacts with stomach acid

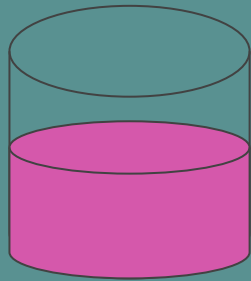




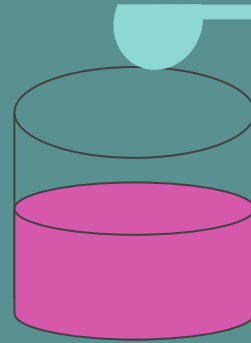
# Acid- Base Titration

- Titration is a technique to determine the concentration of an unknown solution.
- Titration is the slow addition of one solution of a known concentration to a known volume of another solution of unknown concentration until the reaction reaches neutralization.
- Acid-Base titrations are usually used to determine the concentration of the unknown acid or base through acid base reactions.
- An acid base indicator a pH meter is used to observe the acid base reaction during the titration.

# Acid- Base Titration



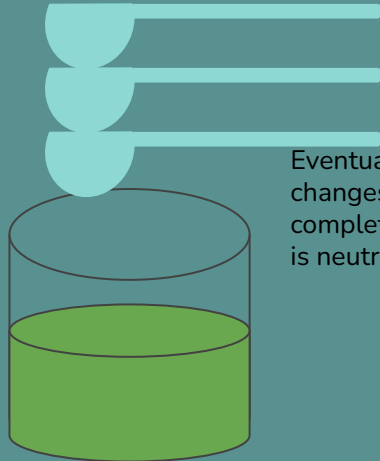
An acid with indicator showing red color, no base added.



One spoonful of base added, but the solution is still acidic.



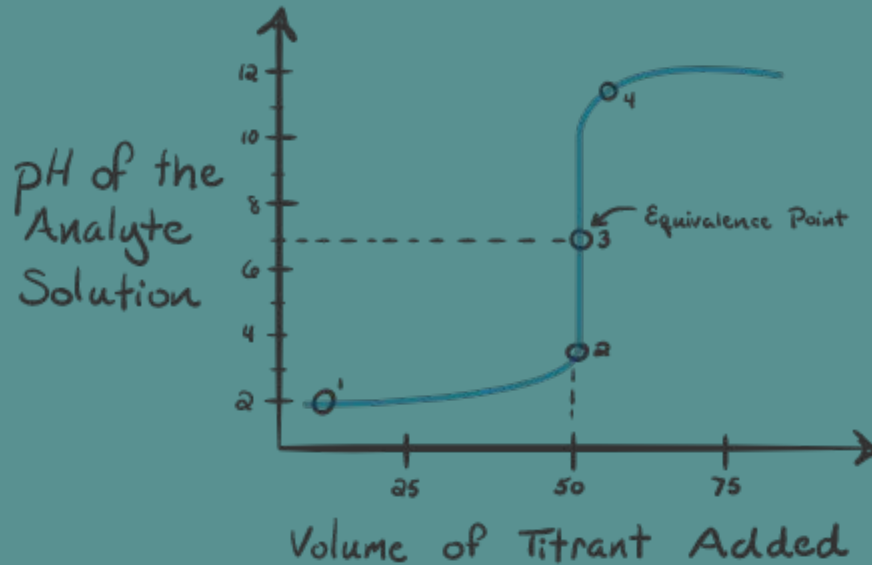
The solution starts to change color as more spoonfuls of base are added.



Eventually the solution changes color completely as the acid is neutralized.



# Plot of an Acid- Base Titration



<https://www.khanacademy.org/>



## Summary

- Adding an acid increases the concentration of hydrogen ions in the solution.
- Adding a base decreases the concentration of hydrogen ions in the solution.
- When an acid is added to a base, or a base is added to an acid, an acid-base neutralization reaction occurs.
- Acid-Base titrations are usually used to determine the concentration of the unknown acid or base through acid base reactions.