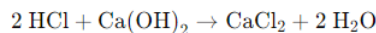


## 7.10: Acid-Base Properties of Salt Solutions

### Learning Objectives

- To recognize salts that will produce acidic, basic, or neutral solutions in water
- To understand the Lewis acidity of small, highly-charged metal ions in water

The chemical reaction between hydrochloric acid (HCl) and calcium hydroxide (Ca(OH)<sub>2</sub>) to produce calcium chloride (CaCl<sub>2</sub>) and water (H<sub>2</sub>O) is an example of an acid-base neutralization reaction. Here is the balanced chemical equation for this reaction:



This reaction shows that two moles of hydrochloric acid react with one mole of calcium hydroxide to produce one mole of calcium chloride and two moles of water.

- All acids get neutralized with bases to produce salt solution and water molecules!
- Any base can be neutralized with acid, to produce salt solution and water molecules!

This phenomenon is called **Acid Based Neutralization**.

Here are some simple explanations and examples of the physical properties of acids and bases:

### Physical Properties of Acids

#### 1. Taste:

- Acids have a sour taste.
- **Example:** Citrus fruits like lemons, limes, and oranges contain citric acid, which gives them their sour flavor.

#### 2. Smell:

- Some acids have a sharp, pungent smell.
- **Example:** Vinegar, which contains acetic acid, has a distinctive strong smell.

#### 3. pH Level:

- Acids have a pH level less than 7.
- **Example:** Lemon juice has a pH around 2-3, making it a strong acid among common household substances.

#### 4. Reactivity with Metals:

- Acids react with certain metals to produce hydrogen gas.
- **Example:** Hydrochloric acid in the lab reacts with zinc to produce hydrogen gas and zinc chloride.

### Physical Properties of Bases

#### 1. Taste:

- Bases have a bitter taste.
- **Example:** Baking soda (sodium bicarbonate) has a slightly bitter taste, though it's usually experienced in small quantities in food.

#### 2. Feel:

- Bases feel slippery or soapy to the touch.
- **Example:** Many cleaning products, like household ammonia, feel slippery because they contain bases.

#### 3. pH Level:

- Bases have a pH level greater than 7.
- **Example:** Household ammonia, used in many cleaners, has a pH around 11-12, making it a strong base.

#### 4. Conductivity:

- Bases can conduct electricity when dissolved in water.
- **Example:** Lye (sodium hydroxide), used in oven cleaners, conducts electricity when dissolved in water.

Simple Examples:

1. **Citrus Fruits** (Acidic):

- Contain citric acid.
- Sour taste, pH around 2-3.
- Example: Lemon, lime, orange.

2. **Vinegar** (Acidic):

- Contains acetic acid.
- Sour taste, strong smell, pH around 2.4.
- Example: Used in salad dressings and for cleaning.

3. **Baking Soda** (Basic):

- Contains sodium bicarbonate.
- Slightly bitter taste, pH around 9.
- Example: Used in baking and as a cleaning agent.

4. **Household Ammonia** (Basic):

- Contains ammonium hydroxide.
- Slippery feel, strong smell, pH around 11.
- Example: Used in window cleaners and other household cleaners.

These examples help illustrate the everyday presence of acids and bases and their physical properties.

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