

Acids and Bases

- **Acids**

- substances which dissolve in water to form H⁺ ions in solution



*Like all equations, dissociation equations are written in balanced form

Properties:

- a) contain hydrogen ions $\rightarrow \text{H}^+$
- b) conduct electricity due to ionization
= are soluble in water and "dissolve" making ions
- c) react with metals to produce hydrogen gas $\rightarrow \text{H}_2 \text{(g)}$
- d) taste sour (if safe to taste)
- e) if strong enough they will cause severe burns

Ie) citrus, vinegar, pop, stomach acid (HCl), battery acid (H₂SO₄)

- **Bases**

- substances that dissolve in water to form OH⁻ ions in solution



Properties:

- a) contain hydroxide ions $\rightarrow \text{OH}^-$
- hydroxide ions will accept hydrogen ions to form water
- b) conduct electricity due to ionization
- c) taste bitter (if safe to taste)
- d) feel slippery (if safe to touch)
- e) if strong enough, bases will cause severe burns

Ie) soap, toothpaste, ammonia, antacids (tums), glass cleaner

Identifying Acids and Bases

- **pH Scale (Logarithmic scale → base 10)**
 - pH is a measure of the acidity of a solution (concentration of H^+)
 - ranges from 0 to 14
 - Acids: pH smaller than 7
 - Bases: greater than a pH of 7
 - Neutral substances have a pH of 7
 - **Acid/Base Indicators**
 - substances which are used to determine if a compound is acidic or basic safely
- Types of Indicators
- a) pH Paper (Universal Indicator Paper)**
 - measures the strength of an acid or a base and changes color accordingly
 - the stronger a substance, the farther from pH 7 it will be
 - a pH of 1 is 10 times more acidic than a pH of 2
 - a pH of 12 is 10 times more basic than a pH of 11
 - b) Litmus Paper**
 - uses a dye from a lichen plant in the paper
 - turns red in the presence of acid
 - turns blue in the presence of bases

c) Synthetic Indicators

- solution that change color in the presence of an acid or base
- contain synthetic dyes

Ie)

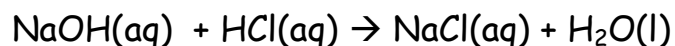
Indicator	Presence of Acid	Presence of Base
Phenolphthalein	Colorless	Pink
Bromothymol blue	Yellow	Blue
Methyl Red	Red	Yellow
Congo Red	Blue	Red

- **Neutralization**

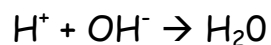
- you can mix an acid and a base and make a neutral solution
- this is called a **NEUTRALIZATION REACTION**
- these reactions always take the following form:



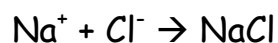
Ie) sodium hydroxide + hydrochloric acid \rightarrow sodium chloride + water



- the H^+ ions react with the OH^- ions to make water:



- the Na^+ ions in the acid react with the Cl^- ions in the acid to make sodium chloride:



Acids and Bases

- **Acids**

- substances which _____ in water to form _____ in solution

ie) _____

*Like all equations, dissociation equations are written in balanced form

Properties:

a) contain _____ ions $\rightarrow H^+$

b) conduct electricity due to _____

= are soluble in water and break apart into their ions

c) react with metals to produce _____ gas $\rightarrow H^2(g)$

d) taste _____ (if safe to taste)

e) if strong enough they will cause _____

Ie) citrus, vinegar, pop, stomach acid (HCl), battery acid (H₂SO₄)

- **Bases**

- substances that dissolve in water to form _____ in solution

ie) _____

Properties:

a) contain _____ ions $\rightarrow OH^-$

- hydroxide ions will accept hydrogen ions to form water

b) conduct electricity due to ionization

c) taste _____ (if safe to taste)

d) feel _____ (if safe to touch)

e) if strong enough, bases will cause _____

Ie) soap, toothpaste, ammonia, antacids (tums), glass cleaner

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 - uses a dye from a lichen plant in the paper
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 - turns _____ in the presence of bases

c) Synthetic Indicators

- solutions that change color in the presence of an acid or base
- contain synthetic dyes

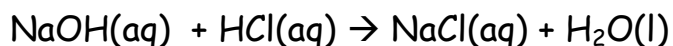
Ie)

Indicator	Presence of Acid	Presence of Base
Phenolphthalein		Pink
Bromothymol blue	Yellow	
Methyl Red		Yellow
Congo Red	Blue	

- **Neutralization**

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Ie) sodium hydroxide + hydrochloric acid → sodium chloride + water



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