

Table 1 Examples of Some Common Acids

Common name	Formula	Source or use
vinegar (acetic acid)	$\text{HC}_2\text{H}_3\text{O}_2(\text{aq})$	
citric acid	$\text{HC}_6\text{H}_7\text{O}_7(\text{aq})$	
ascorbic acid	$\text{HC}_6\text{H}_7\text{O}_6(\text{aq})$	
lactic acid	$\text{HC}_3\text{H}_5\text{O}_3(\text{aq})$	
carbonic acid	$\text{H}_2\text{CO}_3(\text{aq})$	
acetylsalicylic acid (ASA)	$\text{HC}_9\text{H}_7\text{O}_4(\text{aq})$	
sulfuric acid	$\text{H}_2\text{SO}_4(\text{aq})$	

Did You Know?
The taste of sour milk is caused by lactic acid, the same molecule that accumulates and causes pain in your muscles when you exercise.

Did You Know?
Stomach acid is a solution of hydrochloric acid. The inside lining of the stomach is acid-resistant. However, if this lining is damaged, the acid can attack the stomach wall and cause ulcers to form.

common acids

(base =)

Table 2 Examples of Some Common Bases

Common name	Formula	Use
sodium hydroxide	$\text{NaOH}_{(\text{aq})}$	
potassium hydroxide	$\text{KOH}_{(\text{aq})}$	
aluminum hydroxide	$\text{Al}(\text{OH})_3(\text{aq})$	
ammonium hydroxide	$\text{NH}_4\text{OH}_{(\text{aq})}$	
sodium bicarbonate	$\text{NaHCO}_3(\text{aq})$	
potassium sulfite	$\text{K}_2\text{SO}_3(\text{aq})$	

Common Bases

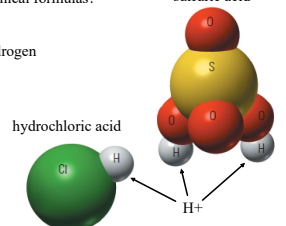
Properties of acids and bases

Acids	Bases
Ionic compounds	Ionic compounds
Contain hydrogen ions (H^+)	Contain hydroxide ions (OH^-)
Dissolve in water and release H^+	Dissolve in water and release OH^-
Very reactive	React with proteins
Strong acids are corrosive	Strong bases are corrosive

Properties of Acids

Can we recognize acids and bases from their chemical formulas?

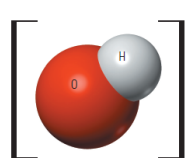
- the formulas for common acids begin with a hydrogen
- e.g., sulfuric acid is H_2SO_4
phosphoric acid is H_3PO_4
carbonic acid is H_2CO_3
hydrochloric acid is HCl



What do they all have in common?
- a hydrogen ion available to react

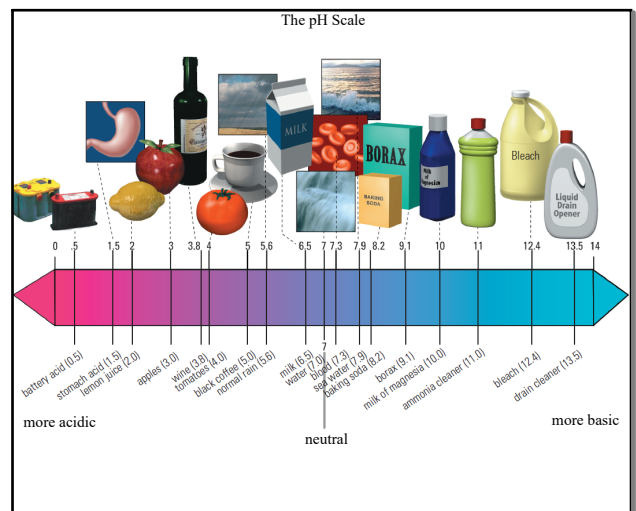
Formulas of Acids

- some bases are as easy to recognize as acids.
- most are compounds that contain the hydroxide ion (OH^-)
- e.g., sodium hydroxide is NaOH



hydroxide ion

Formulas of Bases



pH Scale

Naming Acids

Rules:

- Name the first ion (hydrogen) in full and change the name of the second ion to end in "ide" (unless it is polyatomic)
- Change to the acid name using the following categories:

H + _____ate = _____ic acid H_2SO_4 = hydrogen sulfate \rightarrow sulfuric acid
 $\text{H}_2\text{SO}_4(\text{aq})$

H + _____ite = _____ous acid H_2SO_3 = hydrogen sulfite \rightarrow sulfurous acid
 $\text{H}_2\text{SO}_3(\text{aq})$

H + _____ide = hydro _____ic acid HCl = hydrogen chloride \rightarrow hydrochloric acid
 $\text{HCl}(\text{aq})$

- When writing the formula, add the subscript aq (aqueous).

Naming Acids

Naming Acids Practice

- hydrochloric acid

- nitric acid

- $\text{HNO}_2(\text{aq})$

- $\text{H}_2\text{CO}_3(\text{aq})$

- benzoic acid

- $\text{HCH}_2\text{COO}(\text{aq})$

- $\text{HClO}_3(\text{aq})$

- $\text{HMnO}_4(\text{aq})$

Practice

Naming Acids Quiz

If you're sitting on the left, answer the odd-numbered questions. If you're sitting on the right, answer the even-numbered questions.

- hydrobromic acid
- hydrofluoric acid
- $\text{H}_2\text{SO}_3(\text{aq})$
- phosphoric acid
- $\text{H}_3\text{BO}_3(\text{aq})$
- $\text{HClO}_2(\text{aq})$
- perchloric acid
- $\text{H}_2\text{CrO}_4(\text{aq})$
- $\text{H}_2\text{S}(\text{aq})$
- $\text{HCN}(\text{aq})$

Quiz

Neutralization Reactions

- happen when acids and bases are mixed together.
- products are water and a salt
- these products are neutral (not acidic or basic)
- a salt is an ionic compound made through neutralization

What reaction type is this?

acid + base \rightarrow water + salt

e.g., $\text{HBr}(\text{aq}) + \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{NaBr}$ double displacement

(HOH) a salt

Try this one:

Hydrochloric acid reacts with sodium hydroxide to produce sodium chloride and water.

$\text{HCl}(\text{aq}) + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

Try this one:

Sulfuric acid reacts with potassium hydroxide to produce potassium sulfate and water.

$\text{H}_2\text{SO}_4(\text{aq}) + 2\text{KOH} \rightarrow 2\text{H}_2\text{O} + \text{K}_2\text{SO}_4$

In all neutralization reactions, the hydrogen ion from the acid (H^+) joins with the hydroxide ion from the base (OH^-) to form water.

$\text{H}^+ + \text{OH}^- \rightarrow \text{HOH}$ (i.e., H_2O)

from the acid from the base

Acid-Base Reactions

Write balanced chemical equations for each of the following:

- hydrochloric acid and sodium hydroxide
- hydrochloric acid and potassium hydroxide
- nitric acid and sodium hydroxide
- sulfuric acid and magnesium hydroxide

Practice

Acid-Base Reactions Quiz

If you're sitting on the left, answer the odd-numbered questions. If you're sitting on the right, answer the even-numbered questions.

- hydrofluoric acid and calcium hydroxide
- hydrobromic acid and sodium hydroxide
- nitric acid and lithium hydroxide
- sulfuric acid and magnesium hydroxide
- chlorous acid and magnesium hydroxide
- sulfurous acid and sodium hydroxide

Quiz