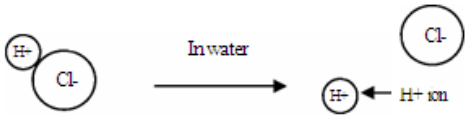
Acids and Bases

Acids

Arrhenius acids are compounds that add H+ ions to water when in a solution.



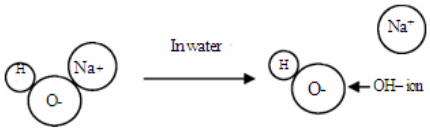
HCl

Hydrochloric acid:
a very strong acid.

In water it breaks up (dissociates) and adds H^+ ions.

Bases

Arrhenius bases are compounds that add OH- ions to water when in a solution.

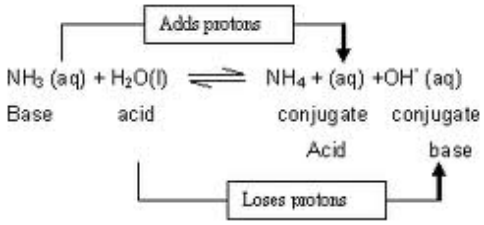


NaOH
sodium hydroxide:
a very strong base.

In water it breaks up (dissociates) adding OH– ions to the water.

Bronsted-Lowry

(conjugate) acids **donate** protons (H+)



Bronsted-Lowry

(conjugate) bases **accept** protons (H+)

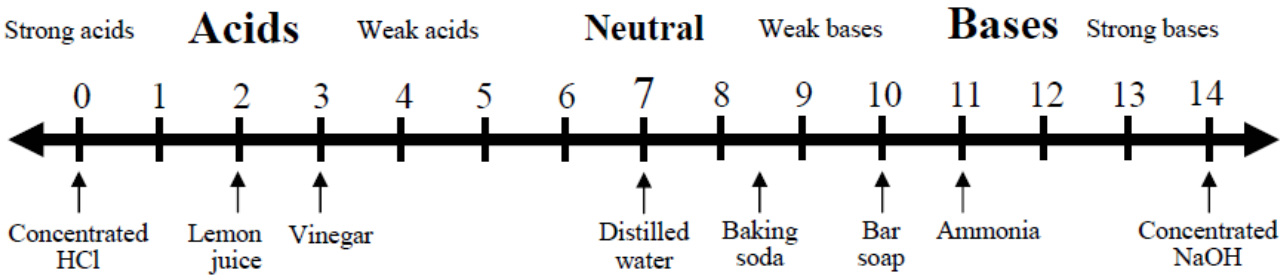
Many of our foods are acidic: citric (lemons; oranges); apples; tomato sauce.

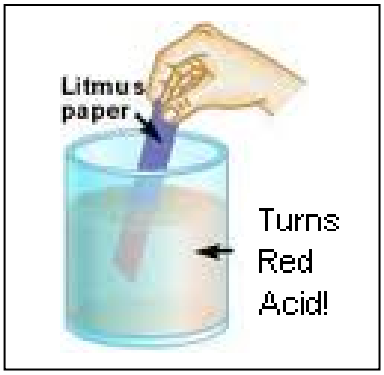
Acids taste **sour** and feel "**squeaky**" when you rub your fingers together.

Many of our cleaning products are basic: ammonia (Windex); soap; bleach.

Bases taste **bitter** and feel **slippery**.

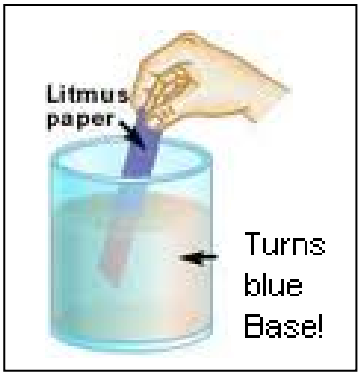
pH—Measure of Acids and Bases





Litmus Test

You can use Litmus paper to test whether a substance is an acid or a base!



pH and Acid Rain

Plants and animals need water close to neutral (pH 7) to survive.

Due to pollution from combustion reactions, rain today can be acidic. Rain less than pH 5.6 we call **acid rain**.

Acid rain can kill plants, cause asthma and other physical problems.

Acid rain also eats away statues and historical landmarks.

The Roman ruins, the pyramids of Egypt, and other treasures of the world are being slowly dissolved away by acid rain. More damage has been done in the last century than in the last 2,000 years.

Without stopping pollution (and acid rain) these treasures may be lost forever.

1. Acid	A. To mix acids and bases to cancel each other out and make salt water.
2. Base	B. A compound that adds H+ ions to water.
3. Neutral	C. Equal number of H+ and OH– ions; water is an example.
4. Neutralize	D. A compound that adds OH– ions to water.
5. Acid Rain	E. When pollution causes rain to be acidic (pH of less than 5.6).

1. pH	A. The measure of acids and bases.
2. Salt Water	B. A compound that adds a few OH– ions to water.
3. Strong Acid	C. The product of a neutralization reaction between an acid and a base.
4. Weak Base	D. A compound that adds a few H+ ions to water.
5. Weak Acid	E. A compound that adds a lot of H+ ions to water.

Circle the Arrhenius acids and underline the Arrhenius bases.

HCl	$H_2(CO_3)$	H_3PO_4
$H_2(SO_4)$	NaOH	LiOH
$Mg(OH)_2$	$Ca(OH)_2$	HNO_3

Acids or Bases? (below)

Has fewer OH– ions:	pH of 1 to 7:
Has more H+ ions:	pH of 7 to 14:
Has fewer H+ ions:	Feels slippery:
Has more OH- ions:	Tastes sour:

Identify if the substance is an acid or a base.

Ammonia (pH = 12.0) _____
Drain cleaner (pH = 11.0) _____
Milk (pH = 6.8) _____
Coke (pH = 2.6) _____
Listerine (pH = 5.0) _____
Water (pH = 7.0) _____
Pepto Bismol (pH = 5.8) _____
Blood (pH = 7.4) _____
Apples (pH = 3.0) _____
Pickle Juice (pH = 5.45) _____
Lye (pH = 13.0) _____
Lemon juice (pH = 2.0) _____
Battery acid (pH = 1.0) _____
Baking Soda (pH = 8.3) _____
Tomatoes (pH = 4.5) _____

Identify the conjugate acid/base pairs. *(below)*

$$H_2O + NH_3 \rightleftharpoons NH_4^+ + OH^-$$

$$H_2SO_4 + NaOH \rightarrow H_2O + Na_2SO_4$$

Circle the compounds that will turn Litmus paper RED.

HCl	$H_2(CO_3)$	H_3PO_4
$H_2(SO_4)$	NaOH	LiOH
$Mg(OH)_2$	$Ca(OH)_2$	HNO_3

Circle the compounds that will turn Litmus paper BLUE

HCl	$H_2(CO_3)$	H_3PO_4
$H_2(SO_4)$	NaOH	LiOH
$Mg(OH)_2$	$Ca(OH)_2$	HNO_3

Naming Acids: Polyatomic ending **–ate**, acid ending **–ic**. Polyatomic ending **–ite**, acid ending **-ous**. If the ending is **–ide**, add **hydro-** to the beginning and end in **–ic**.

Example: H_2SO_4 sulfuric acid

H_2SO_3 H_2CO_3 HBr