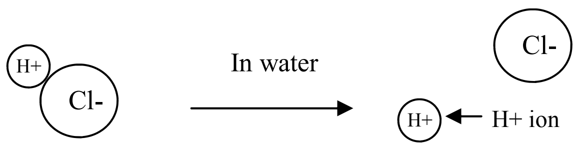
Name: ____________________

Period: ____________________

Acids and Bases

Acids

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

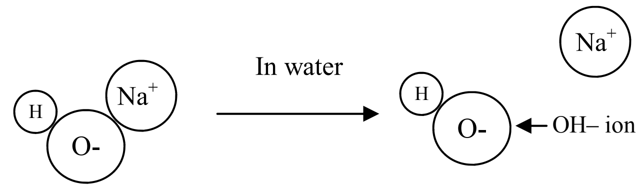


HCl—
Hydrochloric acid:
a very strong acid.

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

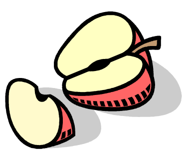
Bases

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.



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**.

Strong acids and bases —ionize almost completely in water, contributing many ions.

Strong acids and bases can burn your skin or eyes.

Weak acids and bases—ionize incompletely, contributing just a few ions.

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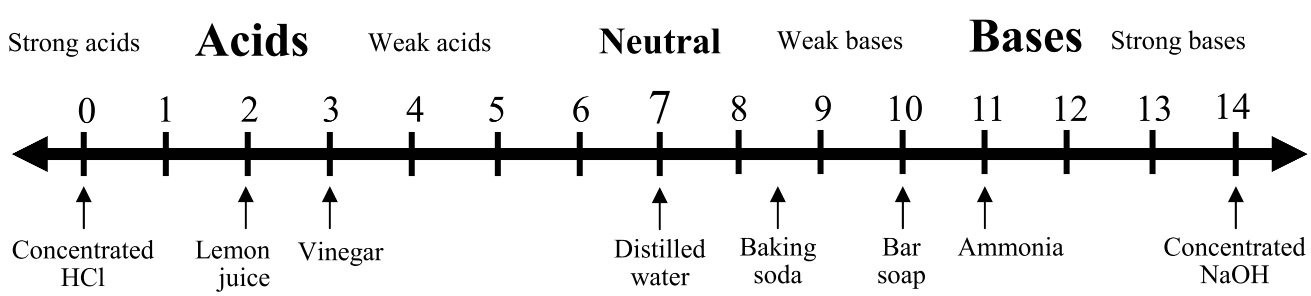
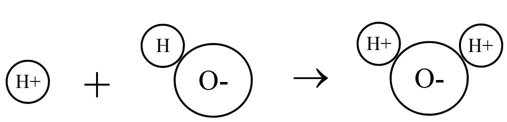
pH—Measure of Acids and Bases



Neutralization (Titration)



$$H^+ + OH^- \rightarrow H_2O$$

When acids and bases are mixed they neutralize each other. If an equal concentration of acid and base are mixed they make neutral salt water.

Typical neutralization reaction

$$HCl + NaOH \rightarrow H_2O + NaCl$$

Acid + Base → Salt Water

“Neutralize that stomach acid” with an antacid—a base! Antacids are just bases.

Name: ____________________

Period: ____________________

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. Raid less than pH 5.6 we call **acid rain**.

Acid rain can kills 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 acids and underline the 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:

Solution A (pH 4); Solution B (pH 2)

Which one has more H+ ions?

Which one has less OH– ions?

Solution A (pH 11); Solution B (pH 13)

Which one has more OH- ions?

Which one has less H+ ions?

Finish this neutralization reaction: (balance the salt, too).

HBr + Mg(OH) →

Circle the ones that are "Soluble".

Saturated	Nonpolar molecules
Insoluble	Dissolves in water
Polar molecules	Doesn't dissolve in water

Circle the ones that are soluble in water.

CaO	K_2O	Al_2O_3
CO_2	NaF	CO

What type of compounds are soluble?

Classify these nuclear reactions as alpha α or beta β decay:

${}^{218}_{84}Po \rightarrow {}^{214}_{82}Pb$ ${}^{210}_{83}Bi \rightarrow {}^{210}_{84}Po$

You have 400 kg of a radioactive substance with a short half-life of 1,000 years. How much will be left after these times:

1,000 years 2,000 years 4,000 years