

# Introduction to Acids & Bases

Name \_\_\_\_\_

Date \_\_\_\_\_

## Part 1: Basic Information about Acids and Bases

<http://www.mcwdn.org/chemist/acidbase.html>

Classify as an acid or a base

1. Taste bitter \_\_\_\_\_
2. Taste Sour \_\_\_\_\_
3. Feels slimy or slippery \_\_\_\_\_
4. Turns litmus paper blue \_\_\_\_\_
5. Turns litmus paper red \_\_\_\_\_
6. Gives off hydrogen gas when it reacts with some metals \_\_\_\_\_

## Part 2: Acids and Bases in everyday use

Complete these paragraphs by filling in or circling the appropriate information based on the information that you know about acids and bases. You may have to use google to find the answers.

When most people think of chemistry the first terms that come to mind are acids and bases. Many of the chemicals that people run across have some connection to acids and bases. For instance many people take medicine every day to cure heart burn. These medicines are **(acids/bases)**. One of these comes in a blue bottle and is known as "Dr. MOM". The common name for this is *Milk Of Magnesia* the chemical name is \_\_\_\_\_ and the chemical formula is \_\_\_\_\_. Another product claims that it is better for us to use because it contains calcium. So in addition to helping relieve the heartburn, it also provides us with needed calcium. This product is called *Tums* and its chemical name is \_\_\_\_\_ and its chemical formula is \_\_\_\_\_.

Another product that is used all the time is *Draino*. Draino is a(n) **(acid/base)** and it has the common name of "lye" the chemical name is \_\_\_\_\_, and the chemical formula is \_\_\_\_\_. This chemical is more dangerous than the ones used for heartburn and can cause blindness or burns. **(Acids/Bases)** are also commonly used to produce soaps and have a **(bitter/sour)** taste.

Seltzer water and all sodas contain a very mild **(acid/base)** known as \_\_\_\_\_. This is formed by dissolving carbon dioxide in water. The chemical formula for this substance is \_\_\_\_\_. Vinegar is a(n) **(acid/base)** finds its way into our diet in ketchup and most salad dressings. The chemical name for vinegar is \_\_\_\_\_, the chemical formula for this substance is \_\_\_\_\_.

Part 3: Arrhenius definition of an acid or base

<http://facultyfp.salisbury.edu/dfrieck/htdocs/212/rev/acidbase/arrhenius.htm>

The Arrhenius definition of acids and bases is one of the oldest. An **Arrhenius acid** is a substance that when added to water increases the concentration of  $H^+$  ions present. The chemical formulas of Arrhenius acids are written with the acidic hydrogens first. An **Arrhenius base** is a substance that when added to water increases the concentration of  $OH^-$  ions present. HCl is an example of an Arrhenius acid and NaOH is an example of an Arrhenius base.



Classify the following as an acid or base using the Arrhenius definition of an acid or base.

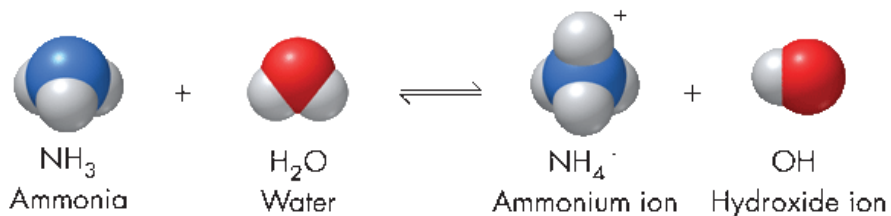
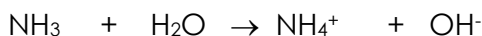
7.  $HNO_3$  is an Arrhenius \_\_\_\_\_ and increases the concentration of \_\_\_\_\_ when added to water.
8. KOH is an Arrhenius \_\_\_\_\_ and increases the concentration of \_\_\_\_\_ when added to water.
9.  $Ca(OH)_2$  is an Arrhenius \_\_\_\_\_ and increases the concentration of \_\_\_\_\_ when added to water.
10.  $H_2SO_4$  is an Arrhenius \_\_\_\_\_ and increases the concentration of \_\_\_\_\_ when added to water.

Part 4: **Brønsted -Lowry** Definition of an acid or base

<http://facultyfp.salisbury.edu/dfrieck/htdocs/212/rev/acidbase/Bronst.htm>

A **Brønsted -Lowry acid** is defined as anything that donates  $H^+$  ions; a **Brønsted -Lowry base** is defined as anything that accepts  $H^+$  ions. This definition includes all Arrhenius acids and bases but, as you will soon see, it is a bit more general. The Brønsted -Lowry concept is based on *the transfer of a proton ( $H^+$ )* from one substance to another.

Look at the example below:



$NH_3$  accepts a proton or  $H^+$  so it is classified as a base.

$H_2O$  donates a proton or  $H^+$  so it is classified as an acid.

Brønsted -Lowery is different than Arrhenius because an acid or a base does not have to form a  $H^+$  or  $OH^-$  ion. An acid has to donate a proton and a base has to accept a proton.

11. A proton is also known as this ion \_\_\_\_\_.

Look at the following reactions and answer the questions below:



12.  $H_2SO_4$  goes to  $HSO_4^-$

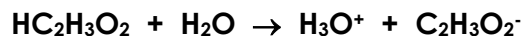
a) Did it gain or lose a proton? \_\_\_\_\_

b) Is it a Brønsted -Lowery acid or base? \_\_\_\_\_

13.  $NH_3$  goes to  $NH_4^+$

a) Did it gain or lose a proton? \_\_\_\_\_

b) Is it a Brønsted -Lowery acid or base? \_\_\_\_\_



14.  $HC_2H_3O_2$  goes to  $C_2H_3O_2^-$

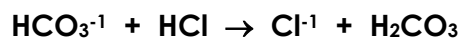
a) Did it gain or lose a proton? \_\_\_\_\_

b) Is it a Brønsted -Lowery acid or base? \_\_\_\_\_

15.  $H_2O$  goes to  $H_3O^+$

a) Did it gain or lose a proton? \_\_\_\_\_

b) Is it a Brønsted -Lowery acid or base? \_\_\_\_\_



16.  $HCO_3^-$  goes to  $H_2CO_3$

a) Did it gain or lose a proton? \_\_\_\_\_

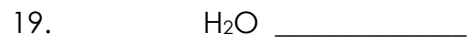
b) Is it a Brønsted -Lowery acid or base? \_\_\_\_\_

17.  $HCl$  goes to  $Cl^-$

a) Did it gain or lose a proton? \_\_\_\_\_

b) Is it a Brønsted -Lowery acid or base? \_\_\_\_\_

The following are Brønsted-Lowry acids. Determine what will form when each donates a proton



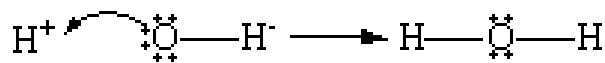
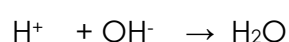
The following are Brønsted-Lowry bases. Determine what will form when each accepts a proton.



### Part 5: Lewis Acids & Bases

[https://www.youtube.com/watch?v=u2Bd\\_U8YoO8](https://www.youtube.com/watch?v=u2Bd_U8YoO8)

A Lewis acid is a substance that can \_\_\_\_\_ a pair of \_\_\_\_\_ to form a covalent bond. While a Lewis base is a substance that can \_\_\_\_\_ a pair of \_\_\_\_\_ to form a covalent bond. All Brønsted-Lowry acids and bases are also Lewis acids and bases, but not necessarily the other way around.



Hydroxide donates the pair of electrons - Lewis base

Hydrogen ion accepts the pair of electrons - Lewis acid

Identify the Lewis acid and Lewis Base in the following reaction: Draw a Lewis dot structure for each to decide which is donating electrons and which one is receiving electrons.

