Acid and Bases

Every beverage and other kinds of drinks, or foods that are eaten, have a specific taste to them. There are foods with sour tastes like buttermilk, lemon juice, orange juice, and certain candies. There is also a second taste that is bitter leading someone to immediately want to spit it out of their mouth. These sour and bitter tastes are caused by acids and bases.

The sour taste, like in orange juice, is tangy and is caused **acids** found in drinks or other foods. The word acid itself comes from a Latin word which means sour: *acere*. There are natural acids in most of the liquids people drink, like orange or lemon juice, meaning they are found in nature. Chemically, acids are molecules that split apart in water releasing hydrogen ions, increasing the number of these ions.

On the other hand, **bases** have a bitter taste, like baking soda, and have a soap-like texture. It will feel soapy if rubbed between the fingers. Both acids and bases were defined in 1887 by a chemist named Svante Arrhenius. Chemically, bases are molecules that split when put in water and release hydroxide ions, but reducing the number of hydrogen ions.

Determining whether a substance is an acid or base cannot be done by tasting every liquid in nature. Instead, there is a special type of substance used to discover whether a liquid is acidic or basic in nature. The different substances are known as **indicators**.

The indicators will change color depending on whether the substance is an acid or base. The indicators, such as litmus, turmeric, and China rose are naturally occurring and are dipped into the liquid to determine its sourness or bitterness.

Litmus is the most commonly used natural indicator. Its natural color is purple, but when an acidic solution touches it, it will turn red. If it is dipped into a basic solution the litmus will turn blue. Litmus is made from organisms called lichens, which come from fungus and alga, and are found in the form of a paper strip or a solution used by chemists and other scientists.

A **pH scale** is used to indicate the number of hydrogen ions in a specific solution. The more hydrogen ions in a liquid, the more acidic the solution. If a solution has more hydroxide ions in it, meaning less hydrogen ions, the liquid would be less acidic and more basic. The pH scale uses a range from 1 to 14, with liquids having a pH value between 0 and 7 as being acidic, with a score of 0 as being the strongest acid. Bases score between 7 and 14 with a liquid having a pH score of 14 being the strongest base. A score of 7 indicates a solution is **neutral** meaning the hydrogen and hydroxide ions in the solution are equal, such as water.

What are pH indicators?
pH indicators are chemicals that change colour depending on the pH of a solution.

◆ Litmus paper can determine whether a solution is acidic or basic. Blue litmus paper turns red in an acidic solution (below pH 7). Red litmus paper changes to blue in a basic solution (above pH 7),

◆A universal indicator contains a number of indicators that turn different colours depending on the pH of the solution.

◆ Phenolphthalein, bromothymol blue, indigo carmine, methyl orange, and methyl red are other common pH indicators. Each determines pH within a different range

Is it an acid and a base?

I. **Observe what happens to the colour of the litmus paper when you put a drop of each substance. Fill in the box in the table given below with the colour you observe:**

No	Solution of	WHAT COLOUR IS THE BLUE LITMUS NOW? (Colour in the box below to show if it is red or blue)	WHAT COLOUR IS THE RED LITMUS NOW? (Colour in the box below to show if it is red or blue)
1	Detergent		
2	Salt		
3	Sugar		
4	Vinegar		
5	Sodium hydroxide		
6	Hydrochloric acid		

II. **Use the information you have noted down and complete the statements:**

1.The substance which changed the colour of blue litmus paper are:

_____

They changed the colour to_____
These substances are _____(sour/soapy)
They are all _____(acidic/basic/neutral)

2.The substances which changed the colour of red litmus paper are:

_____

They changed the colour to_____
These substances are _____(sour/soapy)
They are all _____(acidic/basic/neutral)

3.The substances which have no effect on red and blue litmus papers are:

_____

They are all _____(acidic/basic/neutral)

4.Acidic substances turn _____litmus to _____

5.Basic substances turn _____litmus to _____

6._____ substances have no effect on litmus.

III. Classify the substances you have tested as acidic, basic or neutral.

ACIDIC SUBSTANCES	BASIC SUBSTANCES	NEUTRAL SUBSTANCES

IV. **Now observe the effect of each substance on turmeric paper and observe the change by applying drop of each substance. Complete the table below:**

No	**Solution of**	**IS IT ACIDIC,BASIC OR NEUTRAL?** **(**refer to the earlier information if you don't remember**)**	**WHAT COLOUR IS THE TURMERIC PAPER NOW? (Colour in the box below to show if it is red or YELLOW)**
1	**Detergent**		
2	**Salt**		
3	**Sugar**		
4	**Vinegar**		
5	**Sodium hydroxide**		
6	**Hydrochloric acid**		

POINTS TO REMEMBER

- **Acidity or alkalinity is a measure of the relative amount of H+ and OH- ions dissolved in a solution.**
- **Neutral solutions have an equal number of H+ and OH- ions.**
- **Acids have more H3O+ ions (H+) than OH- ions. Acids taste sour and can be corrosive Bases taste bitter and feel slippery. When an acid is combined with a base, neutralization occurs. The result of neutralization is a salt and water. Neutralization helps return our body pH to neutral.**
- **The process of our bodies maintaining neutral pH so o that proteins can work properly without being denaturated (unfolded) is known as homeostasis.**