

ACIDS AND BASES

If someone asks you, “what is your favorite food? What do you like most about your food?” You will say that you just love the taste of food. The taste of our favorite food makes us feel good.

What makes the food tasty and get different tastes and flavors?

Have you tasted lemon before? It tastes sour because lemon juice contains citric acid and ascorbic acid (vitamin C). Lemon, vinegar, yogurt and buttermilk are all acid foods.

Does that mean it is safe to taste all the acids?

Definitely NOT!

There are different acids. Foods contain natural acids like organic acids. Few are laboratory acids. Our stomach contains a strong acid called Hydrochloric acid helpful to digest the food.



The opposite of acid is one that is base.

Ex: Baking soda

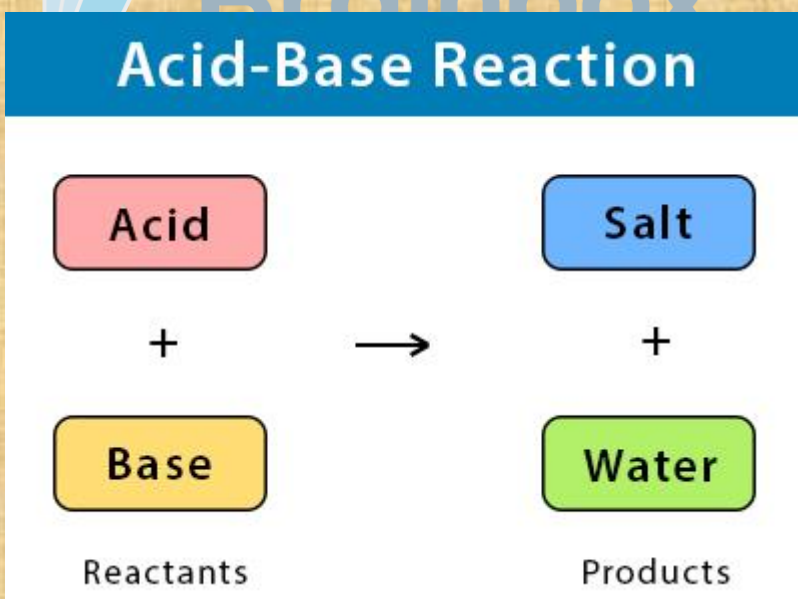
It causes your cake to rise beautifully in the oven.

Bases are bitter in taste and soapy to touch. When bases added to acids, they neutralize the effect of acids. The toothpastes we use are basic in nature. It helps to neutralize acid in our mouth and prevents tooth decay.

Acids and bases react to produce salt and water.

Ex: Common salt (sodium chloride) used in cooking food.

The substances neither acidic nor basic in nature called neutral substances.



An indicator is a dye used to check the acidic, basic, or neutral nature of a solution.

Indicators:

An indicator is a dye that changes color when put into an acid or base. An indicator gives different colors in acid and base. They help to study the acidic or basic properties of substances.

These indicators may be natural or synthetic.

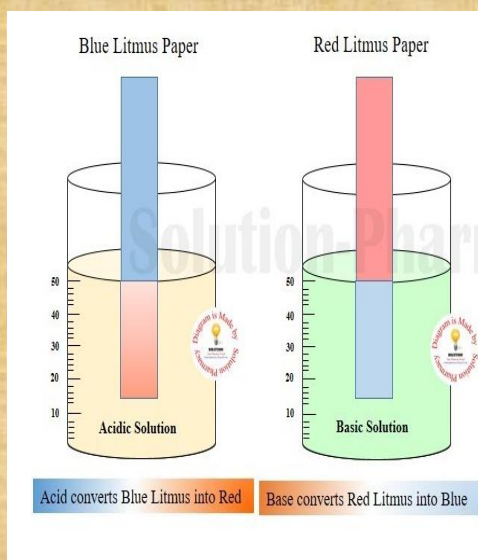
Natural indicators include litmus and turmeric papers.

Litmus paper is the most commonly used indicator in laboratories.

- When an acid added to the blue litmus paper, it turns red indicating acidic nature of the solution.
- When a base added to the red litmus paper, it turns blue indicating the basic nature.

For example a drop of lemon juice changes the color of blue litmus paper to red, indicates the presence of acid.

If a drop of baking soda added to the red litmus paper, it turns blue color indicating the presence of base.



Turmeric is used as indicator in the form of turmeric paper. Turmeric turns red in basic solution.

For example, a yellow stain of curry on white shirt turns red when soap is applied. This is due to the basic nature of soap solution, which changes the color of turmeric in curry stain to red.



Synthetic indicators include methyl orange and phenolphthalein.

Methyl orange gives red color in acidic solutions and yellow color in basic solutions. It remains orange in neutral solutions.



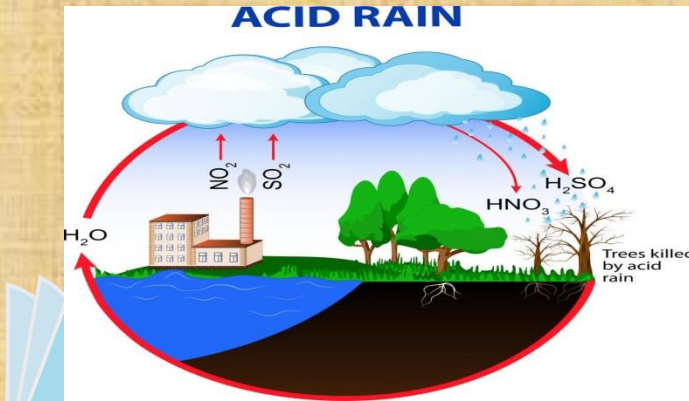
Phenolphthalein remains colorless on acidic solutions and gives light pink color in basic solutions. It remains colorless in neutral solutions.



ACID RAIN:

Acid rain is an unusually acidic rain. It contains a higher level of acid than normal.

Acid rain is caused by the acidic gases like sulphur dioxide, nitrogen dioxide and carbon dioxide which are released into air as pollutants. These gases react with falling raindrops and forms sulphuric acid, nitric acid and carbonic acid. It makes the rainwater acidic.



Acid rain damages stone bridges and monuments made of stone like Taj Mahal. It also damages the aquatic life by making the water of lakes, rivers acidic.

Manures:

Manure is an excellent source of nutrients to support the growth of crops and makes the soil fertile. Manures are plant or animal wastes, used as sources of nutrients to plants.

The sources of Manures include cattle dung, sheep and goat manures, oil cakes, slaughterhouse wastes, crop



wastes etc. These organic manures are cost effective and increase the water holding capacity of soil. These are good sources of all the required nutrients for plants and produces healthy crops. Methane gas evolved as the by-product of manure used for cooking purposes.

Salts:

Salts form when acid and base mixed in equal proportions. The process of acid and base neutralizing each other to form salt and water is neutralization.

For example, common salt is NaCl-Sodium chloride forms by the neutralization of hydrochloric acid and caustic soda. The salt formed depends on the type of acid and base combined.

The salts may be acidic or

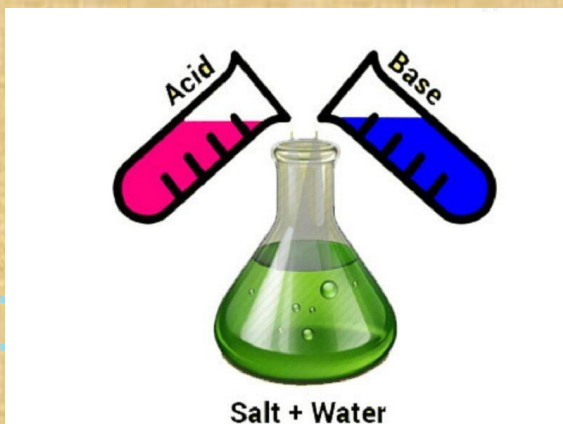
basic. Acidic salts turn blue litmus to red. Basic salts change red litmus to blue.

Neutral salts form by the neutralization of strong acid and strong base. It does not change the color of litmus.

Neutral solutions are neither acidic nor basic like sugar solution.

Summary

- Acids are sour in taste and changes blue litmus to red.



- Bases are bitter in taste, soapy to touch and changes red litmus to blue.
- Indicators used to find the solution whether it is acidic, basic or neutral based on color.
- Turmeric paper and Litmus paper are natural indicators.
- Methyl orange and phenolphthalein are chemical indicators.
- Salts form by the neutralization of acids and bases. Acid and base combine in equal proportions to form salt and water.
- Acidic salts change blue litmus to red and basic salts change red litmus to blue.
- Neutral solutions are neither acidic nor basic like sugar solution.
- Acid rains are unusually acidic by the combination of sulphuric acid, nitric acid and carbonic acid with the rainwater.
- Organic fertilizers are beneficial over chemical fertilizers because they are cost effective, safe and increase the fertility and water holding capacity of soil.
- Salts need not be neutral always they can be acidic or basic.

GLOSSARY

- ❖ Acid – Molecule or ion capable of donating proton.
- ❖ Acidic substance – Sour tasting and has pH less than 7.

- ❖ Acid rain - Combination of Carbonic acid, Sulphuric acid and Nitric acid with rainwater.
- ❖ Base – A substance capable of accepting a proton.
- ❖ Basic Substance – Soapy to touch, bitter in taste and has pH greater than 7.
- ❖ Blue litmus – A natural indicator to study the property of a substance.
- ❖ Indicator – Substances having the property of color change depending on the nature of the material introduced.
- ❖ Neutralization – Acids and bases react with each other and form salt and water.
- ❖ Neutral Substance – A substance neither acidic nor basic and has a pH of seven.
- ❖ Red litmus – a natural indicator to check the property of a substance.
- ❖ Salts – Produced by the neutralization of acid and base in a reaction.