Reactions of acids, bases

Acid–base reactions are essential in both biochemistry and industrial chemistry. Moreover, many of the substances we encounter in our homes, the supermarket, and the pharmacy are acids or bases. For example, aspirin is an acid (acetylsalicylic acid), and antacids are bases. In fact, every amateur chef who has prepared mayonnaise or squeezed a wedge of lemon to marinate a piece of fish has carried out an acid–base reaction. Before we discuss the characteristics of such reactions, let's first describe some of the properties of acids and bases

Acids are chemical substances which are characterized by a sour taste in an aqueous medium. They have the tendency to turn blue litmus red. On the other hand.

Bases are chemical substances which are characterized by a bitter taste and are slippery to touch. Some bases are soluble in water, while others are not.

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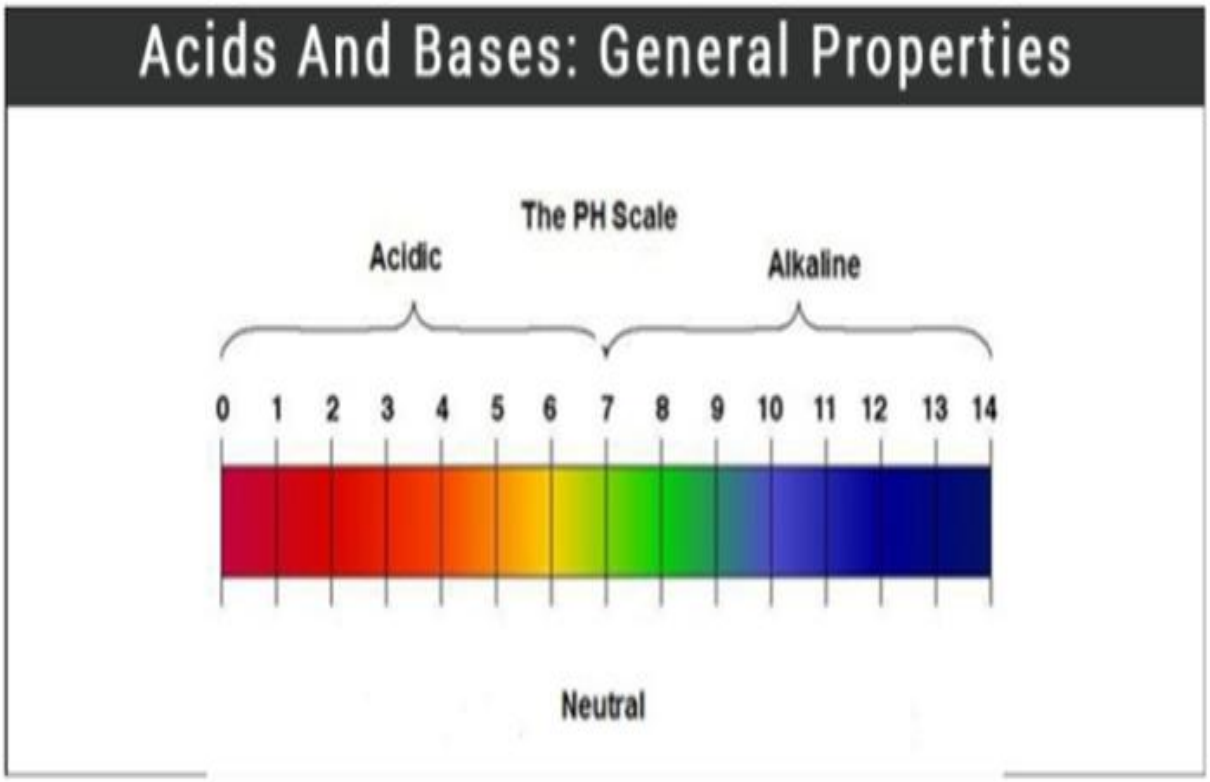
Water soluble bases are known as alkalis. They have the tendency to turn red litmus blue. Acids and bases react with a wide range of chemical compounds to form salts.



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Theories of Acids and Bases

Three different theories have been put forth in order to define acids and bases. These theories include the Arrhenius theory, the Bronsted-Lowry theory, and the Lewis theory of acids and bases. A brief description of each of these theories is provided in this subsection. Acids and bases can be defined via three different theories.

- The ***Arrhenius theory*** of acids and bases states that "an acid generates H^+ ions in a solution whereas a base produces an OH^- ion in its solution".
- The ***Bronsted-Lowry theory*** defines "an acid as a proton donor and a base as a proton acceptor".
- Finally, the ***Lewis definition*** of acids and bases describes "acids as electron-pair acceptors and bases as electron-pair donors".

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Properties of Acids and Bases

Properties of Acids

- Acids are corrosive in nature.
- They are good conductors of electricity.
- Their pH values are always less than 7 (pH < 7)
- When reacted with metals, these substances produce hydrogen gas.
- Acids are sour in taste.
- Examples: Sulfuric acid [H_2SO_4] , Hydrochloric acid [HCl], Acetic acid [CH_3COOH].

Uses of Acids

- Vinegar, a diluted solution of acetic acid, has various household applications. It is primarily used as a food preservative.
- Citric acid is an integral part of lemon juice and orange juice. It can also be used in the preservation of food.
- Sulphuric acid is widely used in batteries. The batteries used to start the engines of automobiles commonly contain this acid.
- The industrial production of explosives, dyes, paints, and fertilizers involves the use of sulphuric acid and nitric acid.
- Phosphoric acid is a key ingredient in many soft drinks

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Properties of Bases

Some properties, like a bitter taste, are owned by all bases. The bases feel slippery, too. on what slippery soap looks like. And this is a foundation. Furthermore, when immersed in water, bases conduct electricity because they consist of charged particles in the solution.

- They are found to have a soapy texture when touched.
- These substances release hydroxide ions (OH^-ions) when dissolved in water.
- In their aqueous solutions, bases act as good conductors of electricity.
- The pH values corresponding to bases are always greater than 7 (Ph > 7).
- Bases are bitter-tasting substances which have the ability to turn red litmus paper blue.
- Examples: Sodium hydroxide [NaOH], milk of magnesia [$Mg(OH)_2$], calcium hydroxide [$Ca(OH)_2$].

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Uses of Base

- The manufacturing of soap and paper involves the use of sodium hydroxide. NaOH is also used in the manufacture of rayon.
- $Ca(OH)_2$, also known as slaked lime or calcium hydroxide, is used to manufacture bleaching powder.
- Dry mixes used in painting or decoration are made with the help of calcium hydroxide.
- Magnesium hydroxide, also known as milk of magnesia, is commonly used as a laxative. It also reduces any excess acidity in the human stomach and is, therefore, used as an antacid.
- Ammonium hydroxide is a very important reagent used in laboratories.
- Any excess acidity in soils can be neutralized by employing slaked lime.

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Difference between Acids and Bases

Acids	Bases
Acid gives off hydrogen ions when dissolved in water.	Bases give off hydroxyl ion when dissolved in water.
It turns blue colour litmus paper into red.	It turns red colour litmus paper into blue.
It has a sour taste.	It has bitter taste and soapy to touch.
Its pH value ranges from 1 to 7.	Its pH value ranges from 7 to 14.
Example: HCl, H_2SO_4 etc.	Example: NaOH, KOH etc.

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Neutral Substances

The neutral substance is a substance which is not acidic or basic, has the same amount of hydrogen and hydroxyl ions, and does not alter the color of the litmus surface.

- These substances do not display any acidic or basic characteristics.
- Their pH values approximate to 7.
- Neutral substances have no effect on red or blue litmus paper.
- The pH of pure water is exactly 7.
- Examples: Water, Common salt (NaCl)

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