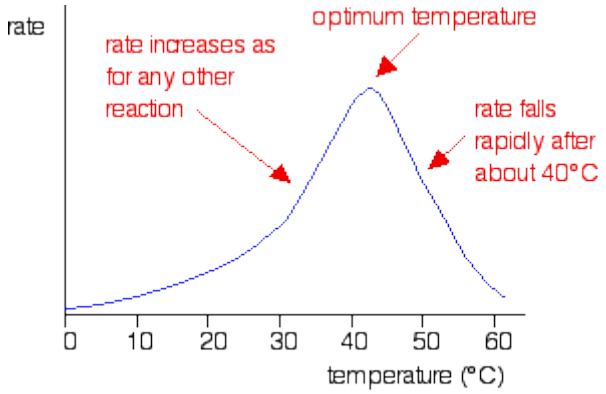
The contact between the enzyme and substrate must essential requirement for the enzyme activity. The important factors that influence the velocity of enzymatic are PH, concentration, temperature, activators etc. Mostly the enzymatic activity is directly influenced by its environmental conditions. Change in environmental condition rate of reaction or the rate of action of the enzyme is also changed. The function of drugs or enzyme is affected by many conditions which are described below:

**Effect of temperature:**

Each enzyme is active at a specific temperature which is called as optimum temperature. The temperature increases the total energy of the chemical system and the reaction velocity is always double with 10° rise in temperature. The activity of an enzyme is decreased when the temperature of the reaction deviate from optimum temperature.

Most of the enzymes in human system have an optimum temperature within the range of 35-40°c. The bell shaped curve is obtained when the graph is plotted between temperature and enzyme activity. Most enzymes are completely destroyed at 100°C but few enzymes such as myokinase a resist even boiling temperature. The tag polymerase which is used for polymerase chain reaction (PCR) can resist upto92 °C.




- ✓ The increase in temperature increases the collision between molecules per unit time and thus increases the kinetic energy.
- ✓ Hence, during the collision of the molecules increase in temperature increases collision with the substrate molecule that ultimately increases a rate of reaction, forming more products.
- ✓ The increase in temperature increases vibrational energy, which puts the strain on the bonds that hold them tightly together.

- ✓ Weak bonds such as hydrogen bonds and ionic bonds will break as a result of strain with the increase in temperature, breaking of bonds within the enzyme cause the active site to change shape.
- ✓ The increase in temperature at first increases the kinetic energy and the effect of bond breaking will become greater and greater, and the rate of reaction will begin to decrease.

**Effect of concentration:**

- ✓ The rate of reaction is directly affected by the change in enzyme and substrate concentration of reaction catalyzed by the enzyme. By controlling these factors enzyme activity is regulated in the cell and the metabolism is carried out in the body.
- ✓ If the concentration of the substance is the limiting factor, then the change in concentration of only substance affects the rate of reaction.
- ✓ If the concentration of the substance is limiting factor the increase in concentration ultimately increases the rate of reaction of up to the point then after which any increase in concentration will affect the rate because it behaves no longer as the limiting factor and another factor will behave as a limiting factor.
- ✓ After the proceeding of reaction, the rate of reaction will decrease slowly because the substrate is being used in a reaction.

**a) Effect of substrate concentration:**

With an increase in substrate concentration the rate of reaction also increases, because more substrate molecule will collide with the molecules of the enzyme, which means more products will be formed. After a certain concentration, there is no effect on the rate of reaction with an increase in a concentration of the substrate concentration will no longer behave as limiting factor and the enzymes become saturated that works at their maximum possible rate.

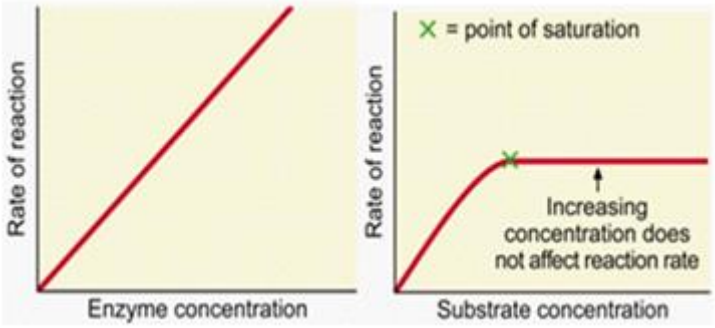
**b) Effect of enzyme concentration:**

Since at high enzyme concentration more enzymes will collide with substrate molecules so increase in enzyme concentration increases a rate of reaction. This is also effective to certain concentration because after enzyme concentration will no longer behave as a limiting factor.

**c) Effect of Product Concentration:**

The accumulation of reaction products generally decreases the enzyme velocity. For certain' enzymes, the products combine with the active site of enzyme and form a

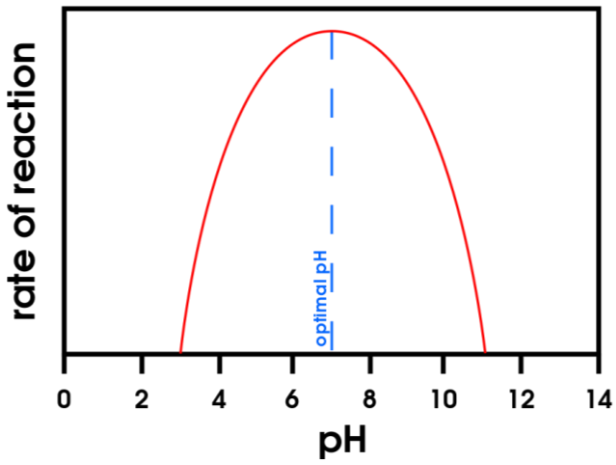
loose complex and, thus, inhibit the enzyme activity. In the living system, this type of inhibition is generally prevented by a quick removal of products formed.




**Effect of pH:**

The increase in hydrogen ion concentration considerably influences the enzyme activity and bell shaped curve is normally obtained. Each enzyme has an optimum pH at which the velocity is maximum. Below and above this pH, the enzyme activity is much lowered and at extreme pH, the enzyme becomes totally inactive. Most of the enzymes of higher organisms show optimum activity around neutral pH (6-8).

The optimum pH is different for different enzymes e.g.; pepsin is maximally active at pH 2 and lysozyme at pH 6.




- ✓ The acidity and the basicity are measured by PH in the solution. PH means the measure of hydrogen ion concentration in the given solution. The acid solution has pH less than 7 and the basic solution has pH greater than 7 up to 14.
- ✓ The optimum pH values are different with different in enzymes nature. The optimum pH value is the pH at which the bond within them is affected by hydrogen ion and hydroxide ion concentration.
- ✓ At the optimum pH, the rate of reaction is also optimum.

- ✓ Change in optimum pH will cause a decrease in the rate of reaction that means the enzyme molecule have active sites having shapes complementary to the shape of their substrate.

**Effect of activators and inhibitors:**

Some of the enzymes require certain inorganic metals like $Mg^{++}$, $Mn^{+2}$ , $Zn^{+2}$,$Ca^{+2}$, $Cu^{+2}$, $Na^{+}$ etc for their optimum activity. Rarely anions are also needed for enzyme activity for e.g.; $Cl^{-}$ for analyzing. Metals functions as activators of enzyme velocity through various mechanisms combining with the substrate, formation of [ES] metal complex, direct participation in the reaction and bringing a conformational change in the enzyme. Enzyme inhibitors are the substances that alter the activity of enzyme i.e. it may slow down the reaction or stop the reaction. There are mainly three types of enzyme inhibition; i.e. competitive, non-competitive and substrate inhibition.

Competitive inhibition is better explained by the theory of ' lock and key model'. In this type of inhibition, the substrate and substance resembling substrate are both added to the enzyme.

In non-competitive inhibitors the substances which are added to the enzyme that alters the enzyme in such a way that it cannot accept the substrate.

Substrate inhibition is not regular occurring inhibition like other two types .It occurs sometimes when excessive amounts of substrate are present.

**Effect of light and radiation:**

The rate of reaction increases with the influence of light and radiation.

**Hydration:**

Hydration level also affects enzyme activity. In general, cells which have high water content have enzymes which are fully hydrated. In mature seeds, spores, pollen grains, which have comparatively low hydration level, the enzyme activity is extremely feeble. In the highly dehydrated tissues the enzyme activity is negligible.

**Effect of Redox Potential:**

Redox potential of the medium also affects the enzyme activity. Thus, several of them have reduced sulphur (—SH) groups that must remain in their reduced form for the enzyme to function.