Immobilized enzyme

Recently, methods have been developed where enzymes are attached to insoluble materials that act as a support for the enzyme. The enzyme can then be help in place during the reaction, removed after words and used again. This is called immobilization of the enzyme. Sometimes entire microbial cells are immobilized.

Immobilized whole cells are useful because, as it is not necessary to stant with a pure enzyme, the process is cheaper and quicker. Whole cells are immobilized in the same way as purified enzymes. They are being used increasingly for complex cultures, such as waste treatment, nitrogen fixation, the synthesis of steroids, semi synthetic antibiotic and other medical products. There are different methods for immobilizing enzyme. They can be: (Fig.)

1- Adsorbed onto an insoluble matrix, such as collagen, (a)

2- Held inside a gel, such as silica gel. (b)

3- Held within a semi-permeable membrane, (c)

4- Trapped in a microcapsule, such as polyacrylamide or alginate beads, (d)

5- This processes all involve a physical bonding of the enzyme. They are not easy to carry out and generally result in low enzyme activity. Alternative enzyme can be chemically bounded to the support medium, (e). Where enzyme activity is high.

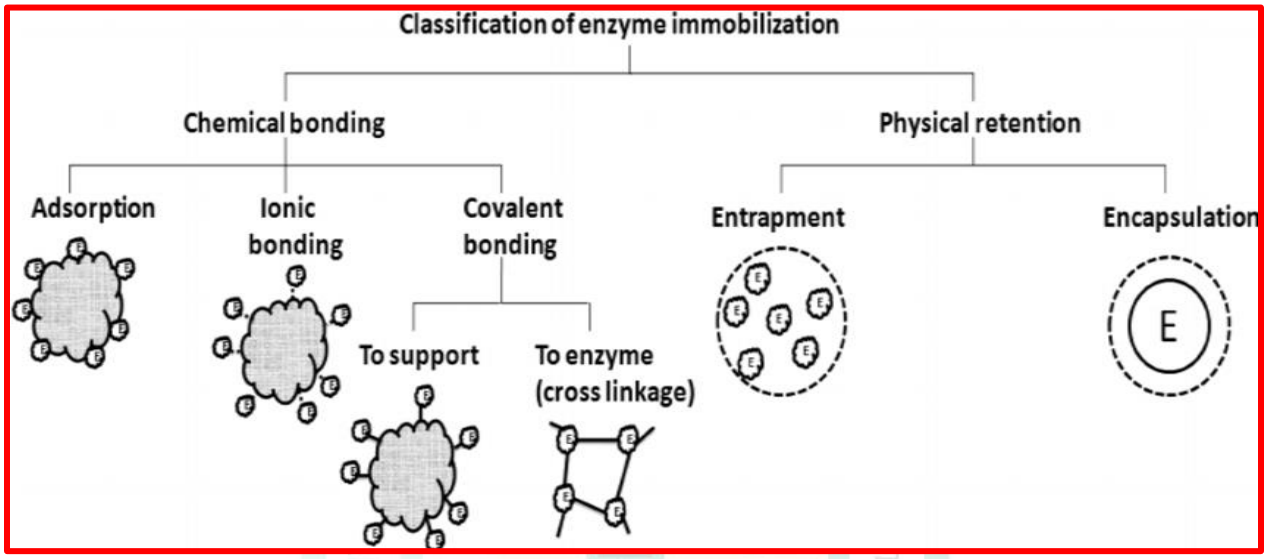

Figure: Immobilization methods of enzymes.

Although preparing enzyme in this way is difficult.

The advantages of using immobilized enzymes are:

1 - Enzymes can be reused again, which is particularly useful when the enzyme is expensive or difficult to produce.

2- The product will not be contaminated by the enzyme, because the enzyme is held in a matrix.

3- The matrix protects the enzyme with a physical condition, so that it is more stable at extremes of temperature and pH.

4- These properties make immobilized enzymes very suitable for continues culture.

5- Immobilized enzymes can be controlled more accurately.

6- Immobilized whole cells mean that several enzymes can participate in the process.