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Perspective

Membrane Technologies in Wastewater Treatment: An overview

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DESCRIPTION

Membrane Technology (MT) includes all engineering approaches for the transport of substances between two fractions by using permeable membrane. In general, mechanical separation techniques for separating gaseous and liquid streams use membrane technology. Membrane separation techniques operate without heating and use low energy than conventional thermal separation technique such as distillation, sublimation and crystallization. The separation technique is purely physical and both fractions permeate and retentate can be used. Membrane Technology (MT) is widely used in food technology, biotechnology and the pharmaceutical industry. Furthermore, by using membranes enables separations that would be impossible with thermal separation methods.

For example, it is impossible to separate the components of azeotropic liquids or solutes which form isomorphic crystals by distillation or recrystallization, but such separations can be achieved by using membrane technology. Depending on the type of membrane, the selective separation of certain individual substances or mixtures of substances is possible. A membrane technology is a separation technique that covers a wide range of problems from particles to molecules, and various types of membranes are available to design process. The membrane is used in Membrane Bioreactor (MBR) for waste treatment in food and dairy, pharmaceutical and other facilities. Membrane processes use a barrier layer that allows water to enter or pass through it but rejects or other components along with that filtrate.

Membrane Technology (MT) is a generic term for a number of different characteristic separation techniques. These methods are the same type because a membrane is used in each of them. Membranes are used more and more often for the creation process of water from groundwater, surface water and waste water. Membranes are now competitive for conventional methods. The membrane separation technique is based on the presence of semi-permeable membrane. The membranes occupy through a selective separation wall. Certain substances can pass through the membrane while other substances are caught. Membrane Filtration (MF) can be used as an alternative for flocculation techniques, sediment purification, adsorption (sand and activated carbon filters, ion exchangers), and distillation. There are two factors that determined effectively of a membrane filtration process; selectivity and productivity. The selectivity is expressed as a parameter is known as the retention factor. Productivity is expressed as a flow parameter is called as flux. Selectivity and productivity are depending on the membrane.

Membranes are not only used for filtration and distillation, they can also be used for gas storage in biogas plants and act as catalysts in synthesis. Membrane Technology (MT) is becoming increasingly important in wastewater treatment with the help of ultrafiltration and microfiltration it is possible to remove particles, colloids and macro molecules, so that wastewater can be disinfected in this way. This is required if waste water is discharged into sensitive waters, especially those designated for contact water sports and recreation. In water treatment, membranes are barriers that allow water to pass through but prevent unwanted substances from passing through it. Similarly to the cell walls in our body, technical membrane filter impurities, viruses and other particles from water. In food industry, the membrane separation technique is mainly used to clarify fruit juices by using microfiltration and ultrafiltration. Membrane separation is also used for concentrating dairy products, and purification of water.

The membrane filtration technique is a physical separation process characterized by the ability to separate molecules of different sizes and characteristics. Its driving force is the pressure between the two sides of a special membrane. Membrane processes are advanced filtration techniques that utilize the separating properties of finely porous inorganic films or polymeric films. Membrane separations are used in a wide range of industrial processes to separate biological macro molecules, colloids, ions, and gases.

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