

Final Blog  
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## Separation Method

Separation process provides an important role in chemical industry, which is widely used in petroleum, gas treatment, and pharmaceutical. The process is used to separate the mixture, purification, identify the composition. During ChemE lab, we have experience on fixed bed adsorption, DNA separation by electrophoresis gel, and different types of chromatography.

Fixed bed adsorption has advantages for separation of the gas mixture. The dynamics of the fixed bed adsorption is determined by the mass transfer from mobile phase to stationary phase. The gas has stronger bonding force with activated carbon will be adsorbed by the fixed bed. The efficiency of fixed bed adsorption is around 60% to 70%, which is acceptable. However, the analysis time is long and gauge pressure can not be measured accurately.

Electrophoresis gel is used to separate the macromolecules such as proteins. The DNA fragments are able to migrate through gel. With different concentration of agarose gel, the different size of DNA migrates at different speed. Thus, the DNA can be easily identified by comparing the DNA ladder. Electrophoresis gel has high separation efficiency with short analysis time. It is widely used in pharmaceutical products.

The principle of chromatography based on the different affinity of soluble molecules with the stationary phase. Chromatography are able to separate and identify multiple composition in the mixture with a high purification. However, large quantity of samples is not able to apply on chromatography.

Based on different chemical or physical properties, chemical engineers are supposed to select the optimal ways with high separation efficiency. There are more advanced separation techniques that are widely used in purifying nuclear fuel, polyolefins, etc. The next step to improve the separation techniques is to increase the separation efficiency with feasible investment.