A Review on the Production Processes of Acrylonitrile-Butadiene-Styrene (ABS) Terpolymer

Part III: Bulk Process

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Abstract

Environmental and economical advantages of bulk or mass polymerization processes have made this process attractive for ABS producers. When an ABS resin with better optical properties is needed, because of small additive and no use of water and solvent, mass polymerization is the first choice. Processing problems of this method such as lower heat transfer, higher viscosity of reaction mass, and hardness of composition and morphology control in final copolymer make it to play a small role in polymerization of grafted ABS polymers. On the other hand, most of the SAN sales in the world markets are produced by this method. In this study, the bulk processes and different aspects including economical, environmental, and easiness or hardness of process control will be studied. In addition, the effects of polymerization process on the physical-mechanical properties like impact resistance and brightness will be discussed.

Keywords: ABS, SAN, Bulk polymerization

Extraction Applications with Superheated Water

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Abstract

As the temperature of liquid water is raised under pressure, between 100 and 374 ºC, the polarity decreases markedly and it can be used as an extraction solvent for a wide range of analytes. Most interest has been in its application for the determination of PAHs, PCBs, and pesticides from environmental samples, where it gives comparable results to Soxhlet extraction but more rapidly and without the use of significant volumes of organic solvents. Unlike SFE, n-alkanes are not extracted unless the pressure is reduced and steam is used. Other applications have included the extraction of essential oils from plant material where it preferentially extracts the economically more important oxygenated components compared to steam distillation. In many cases the superheated water extraction is cleaner, faster and cheaper than the conventional extraction methods.

Keywords: Superheated water; Extraction; Environmental analysis; Pesticides; Essential oils.

Evaluation and comparison of used supports types in cobalt catalyst for Fischer-Tropsch synthesis

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Abstract:
The types of used supports for cobalt catalysts in Fischer-Tropsch Synthesis have been evaluated. For Fischer-Tropsch synthesis, cobalt catalyst is used for producing of middle diatilated products. The support can be effected on the conversion and selectivity of the products. Some patents and papres for evaluation of the supports in the Fischer-Tropsch synthesis have been considered. Also effect of the support based on some practical results has been presented. At the end, all of supports are compared in the fixed and slurry reactors.

Keywords: Cobalt Catalyst, Fischer-Tropsch, Fix Bed, Slurry reactor, Niobia support

Milk sterilization using membranes

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Abstract
For many years, man has recognized nutrition value and role of milk. Since milk has excellent characteristics as food, it can be contaminated rapidly. If health factors are not considered during different stages such as transportation, processing, distributing and consuming, it can be epidemic factor of diseases and various effects from animal to human and vice versa. Using various methods of milk purifying such as thermal methods (pasteurization, sterilization and termisation), UV, super critical fluid , electric energy (pulsed electric field) is required. One of the most important methods is using the membrane processes. Each of the above methods has its own advantages and disadvantages. Although these techniques decrease microbial load, they negatively affect the organolipitic and nutritional properties of milk. However application of membrane processes declines the problems associated with the other methods and provide high quality product without decreasing nutritional value.

Keywords: Milk, Sterilization, Membrane, Microfiltration

Investigation of Membrane Processes in Blood Purification

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Abstract

Hemodialysis (blood purification in patients that suffers irreversible kidney failure) is one of the most important applications of membrane processes in which membrane module is usually in the form of hollow fiber. Blood and dialysate flow countercurrently in inner and outer of the fibers, respectively. Membranes ideally show suitable sieving coefficient that adjusts with the normal kidney action, high blood compatibility, high chemical and thermal resistance (for reuse). To approach high blood purification flux, membranes with hydrophobic polymer supports, having high chemical and thermal resistance, and hydrophilic additives should be used. In hemodialysis, cellulose acetate membranes have advantages such as good biocompatibility and relatively low cost, however, they behave low chemical and thermal resistance. Hemodialysis membranes are generally prepared via phase inversion. Chemical species can be bonded on the surface of membranes to increase their blood compatibility. The main objective of this article is to study the history of hemodialyzers and their optimal performance. Also various membranes, modules and blood purification equipments are investigated.

Key words: Membrane, Blood purification, Hemodialysis, Cellulose acetate

Magnetic Nanoparticles: Applications and biotechnological importance

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Abstract

Magnetic nanoparticles are inorganic nanomaterials that having connections to biological systems and their components. The diameter of the magnetic nanoparticles differs from 10 to 100 nm and compatible to size of cells and intracellular components. Magnetic nanoparticles have recently found many useful and interesting applications in various areas of bioscience and biotechnology such as food industry, molecular and cell biology, microbiology, biochemistry, bioanalytical chemistry and biosensing, immobilization, modification, isolation and bioseparation of biological compounds. Recently increased attention has been paid to the development and applications of magnetic separation techniques. Magnetic solid phase extraction is a new method for isolation and separation of biological active compounds from large volume of solutions. This paper reviews magnetic nanoparticles, the way to synthesize biocompatible particles and their applications in various areas of biological sciences and biotechnologies.

Keywords:Nanoparticles, Magnetic nanoparticles, Magnetism, Magnetic separation, Nanobiotechnology

Investigation of Oxidative Coupling of Methane Process: Kinetic and Economical Aspects

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Abstract

In recent years, there is a strong incentive to study and develop processes that would convert methane into more valuable chemical and petrochemical products. Among various schemes of methane conversion, oxidative coupling of methane (OCM) is promising process to upgrade natural gas. In this article, effective parameters i.e. selectivity, conversion and yield in differential conditions of this process have been investigated. Then some of kinetic models in the gas phase and catalyst surface proposed in literature have been analyzed.

Keywords: Oxidative coupling of methane, OCM, Kinetic models, Catalyst, Plasma, Ethylene, Gas -phase reactions, Surface reactions.

Simulation of Flare Flames

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Abstract

The structure of flare flames are among the most important issues in design of industrial flares. The present paper demonstrates the ability of computational fluid dynamics (CFD) to predict the main features of flare flame structure, namely the length of the flame and its deflection due to cross wind. Results show that by fixing the ratio of cross wind to fuel jet velocities, the flame length increases by increasing the fuel volumetric calorific value. For a specified fuel, the flame length first decreases by increasing the cross flow velocity due to enhancement of mixing. However, further increase in the cross flow velocity causes flame deflection and degrades the mixing process causing an increase in the flame length. The present paper also proposes a correlation for flame deflection as a function of cross wind to fuel jet velocity ratio.

Keywords: Flare, Non-premixed flame, Flame deviation.

Supercritical Water Oxidation Process and Its Application in Treatment of Industrial Wastewater

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Abstract

In the last two decades, supercritical water has become an interesting medium for chemistry. One of its most investigated applications is the oxidative treatment of aqueous wastes containing organic compound in the so-called "supercritical water oxidation". In this technology, supercritical water acts as a non-polar solvent. Consequently, even non-polar organic compounds and gases like oxygen become completely miscible with the supercritical fluid. During the supercritical water oxidation (SCWO) process, the organic compounds react completely with oxidant -mostly oxygen- in a single phase reaction forming CO2 and H2O. The hetero-atoms present in the organic wastes are transformed into the mineral acids. In recent years, using heterogeneous catalysts has motivated much recent research in order to enhance the oxidation rates and reduce the severity of the processing conditions of SCWO and thereby improve the economics. Despite the potential of SCWO as a viable technology for organic waste destruction, its commercial development has been hindered by the problems of corrosion and salt precipitation. Consequently, much research in academia and government laboratories and many companies that have attempted to commercialize SCWO technology, over the years, have devoted considerable effort.

Keywords: Supercritical water, Industrial wastewater, Catalytic oxidation, Corrosion, Salt precipitation.