

Study of Enzymatic Degradation of (Starch/PVA Composite) Film Containing Montmorillonite by Using Alpha-amylase

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Abstract

It is quite important to develop some materials that can biodegrade to minimize the pollution. These materials not only provide the convenience for daily life but also minimize the impact to the environment after being used. In the long run, these materials will decompose into small environmentally friendly molecules and be handled in properly controlled environment.

In this study, first nanocomposite films starch/ Polyvinyl Alcohol (PVA)/ MMT as a consumable plastic packaging industry were prepared by a solution casting method Then analyses the enzymatic degradation behaviour and its degradation enzyme alpha-amylase was evaluated. was studied the effect of factors such as: temperature conditions and the percentage of nanoparticles on the rate of destruction of nanocomposites was evaluated. Nanocomposite films with the amount of destruction tests: water absorption, weight loss, Scanning electron microscopy (SEM) and UV spectroscopy were measured. It was estimated that the nanoparticle declines the destruction. The enzyme ability for destruction is different as: Starch/PVA > Starch/PVA/ MMT.

Keywords: Nanocomposite, Montmorillonite, Enzymatic Degradation, α -Amylas



Basic Parameters on LPG Sweetening

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Abstract

General LPG sweetening method used in Iran's South Pars Gas Complex is Sulfrex liquid-liquid extraction and caustic regeneration processes which uses caustic as alkaline solution to extract mercaptans from propane and butane and also uses LCPS 30 as catalyst to regenerate of spent caustic. This study was focused on the extraction section process. Also effect of the main operating variables on mercaptans extraction, including extraction temperature, concentration, flow rate and amount of caustic as alkaline solution were studied and at the end, according to laboratory results, operational process parameters were optimized and tuned.

Keywords: Sulfrex Process, Mercaptan Extraction, LPG Sweetening, Optimization, Caustic Regeneration

Effects of Various Operation Conditions on the Polarization Layer with Ceramic Membranes

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Abstract

Due to extensive usage of microfiltration membranes in industrial –scale, modeling of this processes are important and imperative. MF is one of the processes which are used for certain types of separation. In this paper, treatment of oily wastewaters with ceramic MF membranes was studied and a new approach has been suggested for modeling the concentration polarization layer in the waste water membrane system. Effects of various operation conditions (trans-membrane pressure (TMP), cross-flow velocity (CFV), temperature (T), oil concentration (C), and filtration time (t)) on the concentration profile and polarization layer are studied. A numerical solution of advection–diffusion equation has been developed using a control volume approach based on the finite element method. As will be observed, model behavior complies well with anticipations.

Keywords: Modeling, Microfiltration, Concentration Polarization, Finite Element



A Review on the Applications of Titanium Dioxide in Polymer Composites and Nanocomposites

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Abstract

Incorporation of inorganic particles and nanoparticles in polymer matrices is the most popular and interesting aspect of composite and nanocomposite synthesis. Polymer/inorganic nanocomposites have attracted much attention as a strategy to improve the properties of synthetic polymers. Among various inorganic particles and nanoparticles, titanium dioxide is an important additive in polymer composites owing to its unique properties such as photocatalytic effect, photostability, chemically and biologically inertness, high refractive index, high dielectric constant, low cost and biocompatibility. The incorporation of titanium dioxide nanoparticles into the polymer matrices gives unique improvements in the properties of the polymer nanocomposites. These nanocomposites could be used in diverse applications. Polymer/titanium dioxide nanocomposites are applied in various areas such as corrosion protection coatings, solar cells, polymer wastes dispose, lithium ion batteries, sensors and actuators. In this paper a brief review on the properties and applications of titanium dioxide nanoparticles in the polymer composites and nanocomposites have been discussed.

Keywords: Titanium Dioxide, Composite, Nanocomposite, Nanoparticles, Polymer

Use of Polyurethane's Foam Condensation Polymerization in Designing a Brake System for a Chemical Automotive

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Abstract

In this paper, the kinetics of polyurethane's foaming reaction is studied in order to be used in the chemical brake system of a chemical automotive. The original aim of this project is to control the volumetric expansion of the product foam, so that it cuts off the electrical current produced by an electrochemical source and stops of the automobile at a previously decided distance. The volumetric ratio of reactants, their initial amounts and also the rate, at which they are mixed in the reactor, have been investigated as the effective parameters on the speed of foam growth at room pressure and temperature. Experiments show the rigorous effect of water amount on the rate of growth and the controllability of the foaming reaction. Increase of volumetric ratio of water from 0.5 to 1 and 2, leads to an intense decrease in the rate of foam growth. Also the Polyol to Diisocyanate ratio affects the uniform growth and the stability of the foam and therefore has an intense effect on the controllability of this reaction.

Keywords: Chemical Automotive, Polyurethane Foam, Kinetics of Reaction



A Review on Underground Natural Gas Storage in Iran and Other Countries

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Abstract

Underground gas storage (UGS) is a universally common method for compensating shortages of natural gas and its excess use in cold seasons. To stores the gas, two ways are usually used: base load and peak load storage. There exists three kinds of reservoirs for storing natural gas: storing in depleted oil (gas reservoirs), aquifer reservoirs, and in salt domes. It is easier and cheaper to use depleted oil and gas reservoirs for sharing natural gas. In this article, the situation of natural gas storage in Iran and the world and its prospect in the future are generally studied. In addition different parts of a storage site and its designing factors are introduced. Evaluation and performance of different reservoirs for storing gas is discussed depended on three parameters: potential gas accumulation, gas untransporting ability and ability of reproducing. At last the situation of natural gas storage projects in Iran containing the gas storage in Qom, Khangiran and some others fields have been pointed.

Keywords: Underground Natural Gas Storage, Types of Storage, UGS Installation

Recent Anaerobic Digestion Processes for Energy Recovery from Different Food Wastes

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Abstract

Complete anaerobic organic matter removal process (CARP), in which diluted wastewaters such as sewage and effluent from a methane fermentation digester were treated under anaerobic condition for post-treatment. The chemical oxygen demand (COD) in wastewater was decreased from 4000 ppm to less than 20 ppm. The dry ammonia-methane two-stage fermentation process (Am-Met process) is useful for the anaerobic treatment of nitrogen-rich wastes such as waste excess sludge and food waste produced without the dilution of the ammonia. The plant generating biogas by the decomposition of volatile solid (VS) at a rate of about 820 N m³ per ton of VS. The hydrogen-methane two-stage fermentation (Hy-Met process) is useful for the treatment of sugar-rich wastewaters, in which 2.67 t/d bread wastes were generated 145 m³ of hydrogen/d which corresponds to 214 kwh with 50% efficiency of the fuel cell the conversion system and 514 m³ methane/d which corresponds to 530 l of oil/d.

Keywords: Complete Anaerobic Organic Matter Removal Process (CARP), UASB Reactor, Methane Fermentation, Hydrogen Fermentation, Ammonia Fermentation, Dry Fermentation



Lactic Acid Production from Deproteinized Whey by *Lactobacillus Bulgaricus* Using Batch Culture

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Abstract

Lactic acid is an organic acid which have a wide range of application in different industries. Novel applications in synthesis of biodegradable plastics have increased the demand for lactic acid. The aim of present research was to investigate the effect of Temperature, PH and different nitrogen source, on the production of lactic acid from deproteinized cheese whey using *Lactobacillus bulgaricus* (ATCC 8001, PTCC 1332) as the producer organism in a batch culture. The initial lactose concentration was 40 g/Lit. Various nitrogen sources were compared with yeast extract in terms of their efficiency for lactic acid production. Process was performed at 72 hour incubation time with no pH control. Highest lactic acid production and efficiency was 24.8 g/Lit. and 0.62% respectively, for medium containing 40 g/Lit. lactose and 20 g/Lit. yeast extract. And also optimal temperature for cell growth and lactic acid production was 32 °C and appropriate pH investigated at 6-6.5.

Keywords: Lactis acid, Batch fermentation, Whey, *Lactobacillus*

A Review on the Applications of Nanoscale Zero Valent Iron (NZVI) in Removal of Environmental Pollutants

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Abstract

Pollution of surface waters by variety of pollutants and also limitation of available surface water sources have caused various and effective water treatment and reuse methods to develop. One of the methods recently studied in the treatment of polluted waters is based on the application of zero valent metals, especially zero valent iron (ZVI). In this method pollutants are removed through the reduction and adsorption mechanisms. In recent years, most of the studies in this area have focused on the application of nano zero valent iron (NZVI) because of their special properties in nano scale. Therefore in this article the applications of NZVI and also the impact of particle size reduction to nano scale in the removal of pollutants will be reviewed.

Keywords: Nanopowder, Zero Valent Metals, Treatment, Heavy Metals, Denitrification, Organic and Inorganic Pollutants