The Investigation of Interactions between Nanoclay and PBT/PP Blend

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Abstract

The aim of this research is the investigation of interactions formed between nanoclay with hydrophilic modifier, and PBT/PP polymer blend. Accordingly, nanocomposites containing 1, 3 and 5 phr of nanoclay were prepared using the melt mixing method. For investigation of interactions in theses nanocomposites, FTIR, X-Ray diffraction and rheological tests were performed. The outcomes of X-Ray diffractions indicate the intercalated structure formed in PBT/PP/Organoclay nanocomposites. Rheological tests along with De Kee model reveal that nanocomposites containing 3 and 5 phr of nanoclay show yield stress due to formation of physical networks. The existence of yield stress in these nanocomposites is the indication of interaction between clay-clay and polymer-clay. Based on the results of De Kee model, nanocomposite containing 5 phr of nanoclay shows higher yield stress in comparison with other samples. The present subject suggests that interactions in this nanocomposite are stronger than other specimens. Moreover, FTIR results prove the interactions formed between hydroxyl groups of organic modifier in nanoclay and hydroxyl and carboxyl groups of PBT.

Keywords: Rheology, PBT/PP Blend, Nanoclay, De Kee Model

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A Review on Materials Encapsulation Techniques and Study on the Micro/Nanocapsules with Polymethyl Methacrylate Shell

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Abstract

Enapsulation is a new technology with many applications in drug delivery, dyes, agriculture and self-healing polymers. Polymethyl methacrylate (PMMA) is one of the polymers that is widely used as shell material in encapsulation. The main approach for materials encapsulation using PMMA as shell is solvent evaporation technique form double water-oil-water emulsion. In the present study, first, the encapsulation of liquid materials with polymeric shell is studied and then the effective factors on the preparation of micro/nanocapsule with PMMA shell will be reviewed.

Keywords: Encapsulation, Self-Healing, Polymethyl Methacrylate (PMMA), Micro/Nanocapsule

A Review on Quantity, Quality and Ways of Treatment of Textile Industry Wastewater

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Abstract

Textile industries wastewater is one of the most important pollutants of environment. Chromogens are the main toxic material presented in wastewater which mostly in intinction and fulfillment processes add to wastewater. Wastewater discharging containing chromegens to environment makes serious problems and can threat humane society which obligates treatment of Textile industry wastewater. There are a lot of ways for treatment but in most of cases applying a combination of ways can be more useful. The main body of this study discuss about ways of Textile industry wastewater treatment. Also the amount of water consuming, processes of wastewater producing and amount of produced wastewater in Textile industry were studied.

Keywords: Textile Industry, Wastewater Producing Processes, Wastewater Quality and Quantity, Chromogen Material

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A Review on Photocatalytic Conversion Process of CO_2 to Methanol

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Abstract

Global warming caused by greenhouse gases is one of the main environmental threats that we face in the 21st century. With increasing concerns, research on converting CO_2 in to valuable compounds has increased. In the past few decades, scientific consensus for capture, fixation and recycling technologies of CO_2 increased. Today, methanol production, as one of the hydrocarbons that can be used in various industries instead of crude oil derivatives, is very important. Photo Catalytic conversion of CO_2 into valuable compounds, in addition to reduce concerns about this pollutant, is a new way to produce synthetic compounds derived from carbon dioxide gas. In this review paper, after presenting the different methods of application and conversion for CO_2, photo catalytic conversion process will have been studied and then catalysts, the required reactions as well as the types of reactors will have been discussed.

Keywords: Photocatalytic Conversion, Carbon Dioxide, Greenhouse Gases, Methanol, Environment

Production of Hydrogen by Steam Reforming of Methanol in a Microchannel Reactor Coated with Catalyst

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Abstract

Microchannel reactors have been used in different catalytic and non-catalytic reactions for hydrogen production extensively in small portable fuel cells. In this paper, general structure of the Microchannel reactor and also catalyst deposition methods on the surface of channels have been studied. Then preparation of a Cu-Zn-Al catalyst with CeO_2 promotor by using sol-gel method has been reported. This catalyst was coated on the channels of a micro-reactor by hybrid method between sol-gel and suspension methods. The catalyst was evaluated at 270ºC and 290ºC. For the catalyst evaluation a mixture of methanol and water with 2:5 molar ratio was used as the feed of the reactor. Flow rate of the feed was 2cc/h in all of experiments. Obtained results show that with increasing temperature from 270ºC to 290ºC methanol conversion is increased from 57.2% to 70.5% and the amount of hydrogen in the output gas phase from reactor was about 63% with low concentrations of CO that was about 1-1.5 percent.

Keywords: Micro-Channel Reactor, Catalyst Coating, Hydrogen Production, Steam Reforming of Methanol

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Simulation of Primary Particle Stability in VC Suspension Polymerization

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Abstract

In this study the electrostaticstability of PVC primary particles formed in suspension polymerization of VCM is simulated. In absence of secondary suspending agents, the primary particles are stabilize through their own small negative electrostatic charge formed from the chain transfer radical reaction into the polymer chains or from dehydrochlorination reaction .Also, evolution of two terms of aggregation kernel and stability ratio of primary particle, which depend on Ionic strength of polymerization media, temperature and charge density, with particle size is investigated. The simulation results show that particle agglomeration most readily occurs between small-small and large-small particles. It can be seen that aggregation kernel and the inverse of stability ratio increases with temperature and the reciprocal Debye length.

Keywords: Poly (Vinyl Chloride), Primary Particles, Electrostatic Stability

Study and Investigation on the Parameters Influencing the Performance of Polymeric Nanofiltration Membranes for Treatment of Chromium and Nickel in Electroplating Wastewater

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Abstract

The treatment of electroplating wastewaters is very importance due to the large number of electroplating factories in Iran and generation of considerable amounts of wastewater. Nanofitration is considered as a viable choice for this purpose due to its various advantages. Investigations reveal that the flux and rejection of nanofiltration membranes for chromium and nickel are governed by the membrane formulation and fabrication as well as the process operational conditions. Beside the selection of an appropriate polymer material, modification of the membrane by using nanotubes, nanoparticles, functionalization by hydrophilic polymers, and other techniques can enhance the rejection to greater than 90% and improve the permeate flux to a desirable level. Changing the operating conditions such as pressure, concentration, pH and other parameters can also further improve the membrane performance. The objective of the present article is to investigate and analyze the effect of various influencing parameters involved in the treatment of chromium and nickel in electroplating wastewater using nanofiltration membranes.

Keywords: **Nanofiltration, Electroplating Wastewater, Chromium and Nickel, Membrane Modification, Performance Enhancement**

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Design and Modeling of a Multicomponent Distillation Process by Modified Newton-Raphson Method

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Abstract

In this work a multicomponent distillation column is modeled using the equilibrium stage model. Modeling is done by solving the set of governing equations using modified newton-raphson method. To ensure the convergence of Newton's method and increase speed to reach the final answer, we tried to modify the initial guesses. Then the corrected values are given as inputs. Correction of initial guesses is performed using tearing equations method. Accordingly base column is modeled and then based on determining optimum operating parameters this column has been redesigned. To evaluate the accuracy, the obtained results were compared with a similar work. Comparisons show full compliance between two works.

Keywords: **Multicomponent Distillation, Equilibrium Stage Modeling, Modified Newton-Raphson Method**

Desulfurization Methods of Liquid Fuels

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Abstract

In this research, desulfurization methods of liquid fuels such as Hydrodesulfurization, Oxidative desulfurization, Biodesulfurization, Absorption desulfurization, Extraction desulfurization and Supercritical water desulfurization are studied. Strengths and weaknesses, parameters and challenges facing each of the methods are investigated. Among these methods, hydrodesulfurization, oxidation desulfurization and absorption desulfurization have industrial technology. But biodesulfurization, extraction desulfurization and supercritical water desulfurization have not Industrial technology and studies continue in this field. Despite these progresses still the most common industrial technology for the sulfur removal is hydrodesulfurization, although this method has disadvantages. Researchers in the fields of oil refining, trying to improve and enhance the current desulfurization methods and find new desulfurization methods for achievement to industrial tchnology of clean fossil fuels production.

Keywords: **Liquid Fuel, Hydrodesulfurization, Oxidative Desulfurization, Biodesulfurization, Absorption Desulfurization, Extraction Desulfurization, Supercritical Water Desulfurization**