Using Polymers as a Binder for Improvement of Mechanical Strength of Tableware in Isostatics Press Technology

A. Arasteh Nodeh
Islamic Azad University, Quchan Branch, Quchan, Iran
E-mail: aliarastehnodeh@yahoo.com

Abstract
Today, producing of tableware has been changed from traditional to modern technology. In the new technology, granulate is pressed with 3% moisture up to 300 bar. The polymer could be used to make up moisture shortage and increase green strength in granulate and mechanical strength in pressed item. This paper presents results of using selected polymer in body mixture. For this purpose, two selected polymers were heated to find their burning curve and were added in different amount in body mixture and were heated in different temperatures to find their influence on mechanical strength. The results of the test showed adding polyvinyl alcohol with different chain could increase mechanical strength without any problem in oxidation atmosphere up to 400°C.

Keywords: **Binder, Polyvinyl Alcohol, Tableware, Mechanical Strength**

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Synthesis Methods and Applications of Titanium Dioxide Nanotubes

A. Vali[1,2], J. S. Soltan Mohammadzadeh[3], A. A. Babaluo[2,3*], A. Ghodarzi[1,2], A. Atarodi[1,2]
1- Chemical Engineering Department, Sahand University of Technology, Tabriz, Iran
2- Nanostructure Materials Research Center, Sahand University of Technology, Tabriz, Iran
3- Chemical Engineering Department, Saskatchewan university of Technology, Saskatchewan, Canada
4- Polymer engineering department, Sahand university of technology, Tabriz, Iran
E-mail: a.babaluo@sut.ac.ir

Abstract
Titanium Dioxide nanotube is one of the best nanometric materials attended by researchers because of its good physical and chemical properties, such as: high surface area, high photocatalytic activity and high ion-exchange capability. In this paper, first the synthesis methods of TiO_2 nanotubes were reviewed then importance of their application in various industries was explained. Due to the application of TiO_2 nanotubes, their physical and chemical properties were investigated. In the other words, by the characterization of the synthesized TiO_2 nanotubes, their application can be determined. The main characterization methods of TiO_2 nanotubes were X-ray diffraction (XRD), transmission electron microscopy (TEM), measuring of surface area, porosity and pore size of samples via gas adsorption method.

Keywords: **Nanotube, Titanium Dioxide, Characterization, Applications**

Review on Natural Gas Storage with Adsorption and Hydrate Formation Within Wet Adsorbent

M. Molashahi[1], H. Hashemipour[*1,2]

1- Chemical Engineering Department, Shahid Bahonar University of Kerman, Kerman, Iran

2- Production and Separation research group, Mining Industries Research Institue, Shahid Bahonar University of Kerman, Kerman, Iran

E-mail: h-hashemipour@mail.uk.ac.ir

Abstract

Natural gas hydrate is formed within pores of porous adsorbents such as activated carbon at low temperature (around 0℃) and relative high pressure (3.5-4 MPa). Amount of adsorbate on wet adsorbent is lower than dry adsorbent at low pressure. This amount is changed with adsorption pressure and moisture content. Maximum gas adsorption is taken place in the optimum moisture ratio which is around unit for all hydrate structure. Using some additives cases deceasing hydrate formation pressure, adjustment of hydrate formation and dissociation rate and increasing adsorption gas amount. In addition, hydrate formation affects on heat of adsorption and therefore improves the gas adsorption capacity.

Keywords: **Methane, Adsorption, Activated Carbon, Hydrate**

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Oxidative Coupling of Methane: Challenges for More Yield

A. Akbari Saei[*], S. M. Mousavi Safavi, N. Bahrami Adeh

Iranian R&D Center of Chemical Industries, Tehran, Iran

E-mail: saei.ali@gmail.com

Abstract

One of the most interesting research subjects in the petrochemical industries is direct methane conversion to ethylene through the "Oxidative Coupling of Methane, OCM" process. For OCM to be economically competitive with current methods, the process must achieve C_2+ selectivity and CH_4 conversion of approximately 85 and 35% respectively. Both gas-phase and surface reactions have critical role in this process. In the base of OCM mechanism, there are two reaction pathways, after methyl radical is formed. The first one leads to the formation of oxygenated species (i.e. HCHO, CO, CO_2) and the second one leads to the formation of C_2+ hydrocarbons. The major research centers attempt to either synthesis of proper catalyst or design the reactor for process control in order to increase of ethylene selectivity. Economically, in order to maximize the reaction yield there are another remedial ways such as ethylene co-feeding, methane recycle and combine with endothermic process. By inspiration of intercellular redox reactions and dehydrogenation process, relevant enzymes, catalysts and biocatalysts that are able to either decrease reaction temperature or increase yield and selectivity, will be developed.

Keywords: **Oxidative Coupling of Methane, Ethylene Production, Mechanism, Reactor, Catalyst**

Mathematical Modeling of Direct Oxidation of H_2S in Fluidized Bed Reactor: Suggestion of Operational Condition for High Performance

F. Golestani, M. Kazemeini*
Chemical Engineering Department, Sharif University of Technology, Tehran, Iran
E-mail: kazemeini@ sharif.edu

Abstract

A mathematical model of direct oxidation of H_2S to elemental sulfur in a fluidized bed reactor with external circulation has been developed in this research. If the deactivation takes place in the fluidized bed , the catalyst will be send to the regeneration zone and then by heating the catalyst up to the sulfur dew point , sulfur will be removed from the catalyst. In this model the changes in H_2S conversion, reactants consumption and product generation in comparison with fixed bed reactor results ,has shown reasonable trends and by analyzing the results, one may suggest appropriate operational conditions for next step of experimental studies. The results show that in good operational condition (that is the temperature between 100 – 130 ◦C and high bed density) and having a catalyst with high activity and stability , direct oxidation of H_2S to elemental sulfur in the fluidized bed reactor may lead to 100% H_2S conversion.

Keywords: **Direct Oxidation of H_2S, Fluidized Bed, Mathematical Modeling**

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Techniques for Preparation of Polymeric Microfiltration Membranes

S. Madaenie*, A. H. Taheri,
Chemical Engineering Department, Razi University, Kermanshah, Iran
E-mail: smadaeni@yahoo.com

Abstract

During the last 20 years, membrane processes were comprehensively expanded compared to the conventional separation techniques such as distillation, absorption, extraction etc. One of the most important membrane processes is microfiltration with an extensive application in various industries. Microfiltration membranes are prepared using several materials such as polymers and metals. In this article the most common techniques for preparation of polymeric membranes are discussed.

Keywords: **Membrane, Preparation, Microfiltration, Polymer**

Investigating the Effect of Pressure and Heating Method on the Performance of Hydrodesulphurization Reactive Column

H. R. Mahdipoor[1*], M. Mohammadi[2], J. Alaei[2], M. Tajerian[2], S. Brojerdi[1]
1- Process Engineering Department, Research Institute of Petroleum Industry, Tehran, Iran
2- Refinary Department, Research Institute of Petroleum Industry, Tehran, Iran
E-mail: mahdipoorhr@ripi.ir

Abstract

In the new Hydrodesulphurization (HDS) process, by integrating the reaction and separation units in a single reactive column, the fixed cost and operational costs can be reduced, as well as more flexible operating conditions will be achievable. Computer simulation is necessary for investigating both the design and operating aspects of reactive columns. This study was performed in different condition such as various temperatures and pressure for gas oil feed, using the software developed in Research Institute of Petroleum Industry (RIPI) which possesses high flexibility. In this paper, the results of substitution Langmuir - Hinshelwood instead of Power low kinetic equation in model for investigating the pressure variation effect, and the results of changing the feed temperature and column heating method are presented. The achieved results show the effect of operating pressure and heating method on the performance of the HDS reactive column. Moreover, simulator capability for applying the rigorous kinetic models and computation convergence was confirmed.

Keywords: **Hydrodesulphurization, Reactive Column Simulation, Langmuir–Hinshelwood Kinetic Equation**

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Sonochemical Synthesis, Characterization and Application of Nanoporous Metal Oxides

M. Gharagozlou
Department of Nanotechnology, Institute for Colorants, Paint and Coatings, Tehran, Iran
E-mail: gharagozlou@icrc.ac.ir

Abstract

Nanoporous metal oxides are an important class of porous materials. It is possible to increase their surface area by different methods and prepare regular pores with specific and similar geometry and also preset dimensions for required applications such as molecular detachment in membrane, molecular selection with high accuracy in the catalytic processes and other applications related to the surface. Nanoporous materials are prepared by conventional methods including hydrolyzing the inorganic precursors (usually metal alkoxide) in an acid, basic or neutral medium in the presence of a surfactant as an organic structure-directing agent. Recently, it has been proved that the application of the sonochemical method in the synthesis of nanoporous metal oxides has great effects. This method reduced the time required for such synthesis by many fold and also produced more stable structures with increased surface area. Excellent experimental results for the use of sonochemistry in the synthesis of silica, titania, yittria-stabilized zirconia (YSZ) and Fe_2O_3 have been achieved. In this article, sonochemical synthesis, characterization and application of nanoporous metal oxides by the surfactant templating method was presented. Finally adsorption-desorption isotherms, pore size distribution and application of SnO_2, Fe_2O_3 and Co_3O_4 nanoporous metal oxides were compared.

Keywords: **Sonochemical Synthesis, Nanoporous Materials, Metal Oxides, Surfactant**

Media Development for Production of Lovastatin by Aspergillus Terreus

A. Samadiafshar, H. Attar*
Science and Research Branch, Islamic Azad University, Tehran, Iran
E-mail: attar.h@srbiau.ac.ir

Abstract

Production of lovastatin and microbial biomass by Aspergillus terreus were influenced based on the carbon and nitrogen sources by Aspergillus terreus were investigated. In this work, Taguchi experimental design was used to investigate the effect of C, N, oxygen content and fermentation time on the concentration of biomass and lovastatin production in batch process. The values of the various factors in the experiment ranged widely, as follows: 24–48 g/L C-concentration; 0.23–0.46 g/L N-concentration; 40–80% (v/v) oxygen and 11-14 days fermentation time. According to optimum conditions 48g/L lactose and 0.23 g/L soybean meal, 30±5 mg/L lovastatin produced during 11 days. Moreover 80% of maximum lovastatin production was obtained after 7 days of incubation.

Keywords: **Lovastatin, Aspergillus Terreus, Optimization, Taguchi**