Evaluating the Resistance of Activated Natural Pozzolan Against Cycles of Freeze-Thaw and Salt-Frost Attack

A. Allahverdi*, S. Zinsaz
Cement Research Center, Iran University of Science and Technology, Tehran, Iran
Email: ali.allahverdi@iust.ac.ir

Abstract
Present research evaluates the resistance of natural pozzolan activated with a solid-compound activator against cycles of freeze-thaw. The deteriorating effects of the freeze-thaw cycles were evaluated through measuring the compressive strength, the total open pore volume, and the amount of water absorption of the mortar specimens. Activated natural pozzolan shows 100% loss of compressive strength after just 75 cycles of freeze-thaw, whereas Portland cement resists 200 cycles of freeze-thaw with only 17.4% reduction in compressive strength. The results obtained for the total open pore volume and the amount of water absorption also confirm the higher vulnerability of the activated natural pozzolan compared to Portland cement. After 50 cycles of freeze-thaw in the presence of 1.5, 3 and 4.5% calcium chloride solution, the mount of scaling in the mortar prisms of activated pozzolan is almost 4 times higher than that of mortar prisms of Portland cement.

Keywords: **Freeze-Thaw, Salt-Frost, Scaling, Compressive Strength**

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Modeling of a New Simple Scheme to Achieve Energy from Ocean Waves

N. Saghatoleslami*, H. R. Karbasian
Department of Chemical Engineering, Ferdowsi University of Mashhad, Mashhad, Iran
Email: slami@um.ac.ir

Abstract
Renewable energy supplies are of steadily increasing importance in all countries. Most governments have substantial plans directed towards commercial development from which wave energy is one of them that has attracted many researchers. In this work, a new mechanism proposed by the authors has been compared with the conventional floating devices that has been utilized to absorb energy from water and convert it to kinetic energy through generators and consequently to electrical energy. The mechanism proposed is simple in structure. In this method, the floating device travels in a circular trend and converts the kinetic energy to electrical energy. The result of this work reveals that the proposed mechanism travels a longer distance compared to conventional process which gains more kinetic energy. To model the mechanism, the momentum and energy equations has been derived using initial and boundary conditions. The results also demonstrate that the proposed technique could theoretically achieve 37 percent more energy compared to the conventional method and its efficiency could be improved by as much as 17 percent. It is also worth mention that the mechanism utilized in this work is simple and does not require high- tech expertise.

Keywords: **Renewable Energy, Ocean Waves, Modeling, Buoyancy Force**

Performance of MFI Zeolite Membranes Used for Hydrocarbons Separation in the Isomerization Membrane Reactors

N. Charchi, M. Ejtemaei, A. Tavakoli, A. A. Babaluo*, B. Bayati
Chemical Engineering Department, Sahand University of Technology, Nanostructure Material Research Center, Sahand University of Technology, Tabriz, Iran
Email: a.babaluo@sut.ac.ir

Abstract

In recent years, combination of the reaction and separation in catalytic membrane reactors has been considered due to the decreasing of the volume, process costs and energy consumption. The unique properties of zeolites specially MFI zeolites (ZSM-5 and silicalite-1), such as well-defined pore size, selectivity and good thermal and chemical stability leads to introduce the zeolite membranes as a good choice for separation process in the membrane reactors. The application of the membranes with desired performance has a considerable effect on the membrane reactor efficiency in such a way that wide researches have been done about the synthesis of membranes without defects and with high selectivity. In the current review, different synthesis methods of MFI membranes applied in the isomerization membrane reactors and their performance in the separation of linear and cyclic hydrocarbon isomers have been investigated based on the previous studies in the literature. Moreover, performance of these reactors using MFI membranes and common fixed bed reactors in the isomerization process has been compared.

Keywords: Membrane Reactor, MFI Zeolite Membrane, Isomerisation, Hydrocarbons Separation

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Investigating and Modeling of the Effects of Rock Properties on CO_2, N_2 Injection Performance

M. S. Momeni[1], N. Teymourei Khanesary[2*]
1- Petroleum Engineering Department, Islamic Azad University, Yasuj, Iran
2- Gas Engineering Department, Petroleum University of Technology, Ahwaz, Iran
Email: nasser.teymourei@gmail.com

Abstract

In this work we used an ideal model of Co_2 injection for studying the effect of rock properties (properties such as permeability, porosity, blocks size and etc) on production and reservoir pressure drop. The model was simulated with ECLIPSE 300, this model includes three production wells and an injection well. In this study, three scenarios were considered: change in the permeability, porosity change and change in the block size. Only the results of N_2 injection were reported due to its better performance, but the figures represent both injection gases. Maximum pressure drop is 10 md and the value is 3986.0283 psia and the lowest pressure drop is 1000 md that the value is 4123.646 psia. Production rate increases with increasing porosity and also with increasing the block size production rate is increased and pressure drop comes down. In the present study, the minimum miscibility pressure was calculated with the help of neural networks.

Keywords: CO_2, N_2 Injection Modeling, Estimation of MMP with Artificial Neural Networks (ANN), the Effect of Rock Properties

Different Methods for Photochemical Synthesis of Conducting Polymers and their Applications

H. R. Heydarnezhad, B. Pourabbas*, M. Sharif
Polymer Engineering Faculty, Sahand University of Technology, Tabriz, Iran
Email: Pourabas@sut.ac.ir

Abstract

Properties of ICPs are strongly dependent on synthesis method, which can be chemical, electrochemical, or photochemical. Recently, photochemical synthesis of conductive polymers due to some advantages as lower cost, simpler equipment required, and capability for use in specific applications has been more attention than the other methods. Photopolymerization of conductive polymers, which generally, divided in two categories: (i) photoexcitation of the monomer and (ii) photopolymerization using photocatalytic species. In the first method, conductive monomer that itself working as a photosensitizer, directly absorb certain wavelengths of radiate light and excites; Subsequently, excited monomers initiate photopolymerization of other conductive monomers that not excited. One of the disadvantages of this method is long time for the polymerization. In the second method, a photosensitizer, such as Ruthenium complexes or organometallic complexes, used to catalyze the process, that absorbed certain wavelengths of radiate light and excites; then electron transfer reaction between excited species and electron acceptor has been performed and leading to strong oxidants formation, that able to polymerization of conductive monomers. In this review paper, various methods for photochemical synthesis of conducting polymers investigated.

Keywords: **Conducting Polymers, Phototpolymerization, Photocatalytic Systems, Photoinduced, Photosentisizer, Photoinitiator**

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Investigation of Design and Construction of a Catalyst on Carbonaceous Support for Removal of Volatile Organic Compounds

M. Zabihi, J. Shayegan*, F. Khorasheh, M. Fahimirad
Department of Chemical and Petroleum Engineering, Sharif University of Technology, Tehran, Iran
Email: Shayegan@sharif.edu

Abstract

Effects of human societies and novel technologies can cause air pollution which has always been the most important environmental threats that are causing problems for humans. Benzene, Toluene and Xylene are the most prominent compounds of volatile organic compounds (VOCs) which have shifted the attention of researches to eliminate these contaminants. The main goal in the present study is to investigate various catalysts for removal of volatile organic compounds with a focus on an activated carbon as a support. Carbonaceous supports have attracted the attention of many researchers because of appropriate surface properties such as high surface area and porosity, as well as low cost and available raw materials. Study of noble metals such as Pt and Pd and transition metals such as Fe, Co, Ni and Cu as active sites is the other prominent aims of this research. Despite of the high activity and efficiency of noble metals in oxidation of VOCs process, using transition metals has been the focus of researchers because of noble metals expensive cost. Also, in this paper, temperature and initial concentration effect as operating conditions on oxidation process have been surveyed briefly.

Keywords: **Catalyst, Activated Carbon, Noble Metals, Transition Metals, Oxidation, Adsorption, Volatile Organic Compounds**

Optimization Approach for Technology Selection in Sirri Island Based on Mixed Integer Linear Programming

A. Vesalinaseh, R. Roshandel*
Department of Energy Engineering, Sharif University of Technology, Tehran, Iran
Email: Roshandel@sharif.edu

Abstract
Increased environmental pollution due to the industrial, municipal wastewaters and considerable power consumption of desalination units has increased the need of wastewater treatment technologies. Oil export quality and reduce costs of the electrostatic desalting, important issues in the upstream oil and gas. In this paper, the variety of technology packages used in the different energy levels in the upstream, regarding to the environmental costs, as a function of investment and operational cost have been compared using a mixed integer mathematical programming models. Technology consists of four technology packages such as electrostatic desalination, industrial, municipal wastewater treatment and water desalination. Technology indexes in each package determine the superior technology timescales during the year. This model developed in Sirri Island and the priority of technology determined by the environmental conditions.

Keywords: Mixed Integer Linear Programming, Upstream Oil and Gas, Electrostatic Desalting, Industrial and Municipal Waste Water Treatments, Technology Packages

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Doping of TiO_2 Nanoparticles by Au for Photo Degradation of Acid Red 88

S. Motamani Tabatabaei*, M. Eissanezhad Boushehri, Sh. Yavari
Faculty of Technical and Engineering, Ahar Branch, Islamic Azad University, Ahar, Iran
Email: samad.tabatabaei@yahoo.com

Abstract
Doping of TiO_2 nanoparticles have been accomplished by Au with 2% wt and using chemical reduction method. Their Photocatalytic efficiencies were evaluated by studying photo degradation of Acid Red 88 as a model contaminant from textile industries in aqueous solutions in the presence of visible light. In these work, Titanium tetra isopropoxide has been used as an organic source. Chemical reduction of Au particles has been done by using NaBH4. Furthermore, synthesizing of nanoparticles in different calcination temperatures (400, 450, 500, 550, 600°C) have been accomplished for achieving the best calcination temperature. The synthesized photocatalysts have been investigated by using various techniques such as X-ray and TEM. However; all of the doped photocatalysts have shown a remarkable photo degradation efficiencies (approximately increase 8% and 25% dye degradation in the presence of UV and Visible irradiation) compared to synthesized TiO_2 in the presence of both UV and visible light sources.

Keywords: Acid Red 88, (Au/TiO_2), Doping, Photocatalyst, Photo Degradation, Gold Particle

Microalgae Harvesting and Dewatering Methods

M. Khalili, Sh. Ghadiri Jafarbeigloo, M. Pazouki*
Energy Department, Materials and Energy Research Center, MeshkinDasht, Karaj, Iran
Email: mpazouki@merc.ac.ir

Abstract

Preparation of Microalgae to produce biofuel involves three stages: cultivation, dewatering and oil extraction. Efficient dewatering of microalgae is the main challenge in industrial scale. The high cost of microalgae production is due to the lack of suitable method for harvesting. This paper aims to describe and compare the different microalgae harvesting methods. As a matter of fact, these methods are divided into three categories which are described as chemical, mechanical and electrical methods. The chemical method consists of coagulation and flocculation steps but none of these steps are economical. Centrifuging is a common method for mechanical harvesting. Relatively this method has high efficiency but it is not cost beneficial because of high energy consumption. Among the electrical methods, electrocoagulation is a new method for microalgae harvesting which offers higher efficiency and demands lower energy than other methods.

Keywords: Biofuel, Microalgae, Microalgae Harvesting Methods, Dewatering