Prevention of Lost Circulation of Drilling Fluids in Fractured Reservoirs Using Lightweight Industrial and Mineral Granular Materials

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Abstract

Lost circulation of drilling fluids in fractured reservoirs is one the major chalenges in petroleum industrials. Economical problems related to such phenomena makes its prevention necessary. In this investigation, prevention of lost is studied using lightweight granular materials and the effect of their concentration and size is evaluated. Experiments were carried out using lightweight industrial and mineral granular materials. The results show that a proper mixture of fine and coarse lightweight industrial granules is suitable for minimizing the fluid loss. It is shown that the best mechanism for lost prevention is plugging of the fractures, which is in good agreement with the results of other investigations.

Keywords: **Lost Circulation, Drilling Fluids, Lightweight Industrial Materials, Mineral Granular Materials**

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Degradation Impact on Optimal Conditions of PEM Fuel Cell

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Abstract

Degradation mechanisms in fuel cell life time, changes the optimal operation conditions. The purpose of this paper is to maximize the productivity of system by considering degradation mechanisms in 10000 hours of fuel cell operation. In present work, a single PEM fuel cell is investigated. Membrane and catalyst layers (anode and cathode electrodes) are considered as the critical components that affect the degradation of the cell. The model used in this work, diagnosis degradation of those layers (platinum degradation in catalyst layers and membrane thinning and dehydration in polymer membrane), and model has been run for 3 strategies. Results showed that by optimizing operational condition continuously, productivity will increase 0.0622×10^4 kw.hr in 10000 hr of fuel cell operation time.

Keywords: **PEM Fuel Cell, Modeling, Optimization, Degradation Mechanisms, Genetic Algorithm, Monitoring**

Production of Glucose Syrup and Bioethanol from Broomcorn Via Enzymatic Hydrolysis and its Simulation by Artificial Neural Network

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Abstract

Grain sorghum is one species of sorghum plant. This plant is used for preparation of brooms. In a sequence of pretreatment; first the seeds (broomcorn seed) are separated from the stems. After making broom, some seeds are remained as surplus, some of them are used as animal feed stocks and the remaining burned. The primary raw material in this project is considered as waste material. This plant has many species: grassy, sweet and grain sorghum. In this article grain sorghum's seeds (broomcorn) are used for production of syrup. Starch is the main source of stored carbohydrates in the broomcorn seed. It constitutes about 70-75% of broomcorn's weight. It is used as substrate for hydrolysis and producing syrup. After pretreatment and elimination of protein inhibitor, enzymatic hydrolysis of starch in broomcorn was investigated. For this purpose, dual enzymes, alpha amylase and amyloglocosidase were used. For finding optimum conditions of hydrolysis, RSM technique and (DESIGN EXPERT) software were used. This software was able to model enzymatic hydrolysis of broomcorn and predicts optimum conditions. The effect of parameters on enzyme hydrolysis was investigated and optimized. The amount of sorghum grains and the enzymes were applied. In addition after optimization, production of reducing sugars from broomcorn was simulated by Artificial Neural Network. Amount of sorghum and alpha amylase and amyloglucosidase were considered as input of artificial neural network and amount of produced sugars was considered as output of neural network. The number of passage, hidden layers and Neron in each hidden layer of neural network was optimized for convergence of the best operation. According to acquired results, a desirable accommodation was produced between experimental data and predicted amount. Therefore neural network was used as a powerful tool for simulating the present process.

Keywords: Broomcorn; Enzymatic Hydrolysis; Glucose Syrup; Artificial Neural Network

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A Review on Application of Combinatorial Catalysis Methods in Heterogeneous Catalysts Design

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Abstract

The widespread and daily increasing application of heterogeneous catalysts in the industry has caused to using new techniques in catalysts design for reducing costs and accelerating research, development and commercialization. The application of combinatorial catalysis methods as new techniques in catalysts design are under development. At this paper, combinatorial catalysis methods including of experimental design, genetic algorithm and meta-modeling has been reviewed.

Keywords: Design of Heterogeneous Catalysts, Experimental Design and Analysis of Experiments, Genetic Algorithm, Artificial Neural Networks

Influence of Operating Condition on Asphaltene Separation from Heavy Crude Oil by Hydrocyclone with CFD Simulation

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Abstract
In this work, a Colman-Thew hydrocyclone type has been simulated by CFD method for asphaltene separation from heavy crude oil. In CFD simulations, the Reynolds Stress Turbulence Model (RSM) and mixture model for multiphase simulation have been used and thirty micron is considered for diameter of asphaltene particles. The CFD simulation results have been compared with the experimental data. The CFD model can predict the hydrocyclone efficiency with ten percent average error. Effect of inlet flow rate, diameter of asphaltene particles, viscosity of continuous phase and hydrocyclone split ratio as operating conditions have been studied by CFD simulation. The results show that the performance of hydrocyclone could be improved with increasing of inlet flow rate and decreasing of continuous phase viscosity. Also 133% improvement on overall efficiency is observed with increasing the diameter of asphaltene particles to 50 micron. Changing the split ratio has the dual effect on performance of hydrocyclone. With increasing the split ratio, the overall efficiency of hydrocyclone is increased but the overflow (product) is reduced, so the optimization is needed.

Keywords: CFD Simulation, Heavy Crude Oil, Asphaltene, Hydrocyclone, Operating Condition

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Review on Modeling of Bioremediation in Rhizosphere

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Abstract
Prediction and control of bioremediation in rhizosphere zone, such as each other process, needs appropriately modeling based on objectives happening in the process. Conditions dominating on rhizosphere bioremediation base on relations among plant roots, microorganisms in soil, soil materials, and relevant pollutant. Objective of this study is offering mathematical models which are able to predict and illustrate soil bioremediation. The models are improved that can be applied according to desired conditions, and be modified to the aims. Successfulness of a model in prediction is a function of circumstances and relationships which govern the process. Modeling can be comprehensive and successful with exactly understanding the function of each part, the proper use of relationships, and modeling equations.

Keywords: Rhizosphere, Modeling, Bioremediation, Soil

Relationship Between Morphology and Rheology in Immiscible Polymer Blends

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Abstract
Due to immiscibility of the most polymer blends, the present article relies on review the theories and relation between morphology and rheology of immiscible polymer blends. The results of morphological investigation revealed that the ultimate structure of immiscible polymer blends relates to two parameters of viscosity ratio and capillary number. Capillary number connected to matrix viscosity, strain rate and interfacial tension as well. The other parameter which affects on drop break-up and morphology of polymer blends is type of flow. The outcomes indicated that droplet breaks-up in elongation flow easier than shear flow. The models of Palierne, Coran, Jarzebski and Doi- Ohta are very famous models in correlation between rheology and morphology of immiscible polymer blends. It was illustrated in Doi- Ohta model the more differences in first normal stresses of immiscible polymer blends the smaller of droplet size of dispersed phase. In Palierne model, the complex modulus of immiscible polymer blends relates to droplet diameter and interfacial tension.

Keywords: Morphology, Rheology, Immiscible Polymer Blends, Viscoelastic, Interfacial Tension

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Carry Over Phenomenon in Sugarcane Industry Boilers and how Control it

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Abstract
Carry Over Phenomenon is one of the common problems in Sugarcane boilers that has a important effect at any type of failure, output loss, trip, out of ordering and other equipments (before and after boiler) failure. It's very important to know how this phenomenon is raised and lead to corrosion failure and fouling on steam drum surface, superheater and reheater tubes, steam turbine blades, … during boiler design and operation.
In this paper, we describe how carry over occur and identify its effective ingredient at first. After that survey any kind of them and related efficacy. Then suggest a scope for evaluation and sampling carry over during boiler operation. Finally, offer some solution to decrease occurrence possibility or percentage with some modification that should be performed in system operation.

Keywords: Boiler, Feed Water, Impurity, Fouling, Carry Over

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Water Desalination Process Using Gas Hydrate Formation

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Abstract

Today the various attempts have been done for developing of water desalination. The significant amount of researches has been performed to improve the technologies and reduce the cost of desalination. In recent years, gas hydrate has been applied in different fields such as the energy storage and separation process. One of the separation applications by hydrate is use of hydrate process for salt remove from water, because salts and impurities were not placed in hydrate structures at hydrate formation process. This research is investigated the potential applications of gas hydrate technologies for water desalination processes. The refrigerants can be formed the hydrate crystals at high temperatures and low pressures, so they are specially recommended in the desalination process. The problems of hydrate formation in desalination are the crystals separation from residual brine. In this study, hydrate-based desalination is investigated with apparatus design to easily extract dehydrated high-density gas hydrates from a reactor containing hydrate slurries that may solve the separation difficulty between hydrate crystals and concentrated brine solutions. Also this paper is presented the suitable hydrate forming and stages of desalination based on hydrate formation.

Keywords: Refrigerant, Separation of Crystal, Water Desalination, Gas Hydrate