Review on Nanoemulsions Production and Comparison of Homogenizers Efficiencies

F. Poorhasan, F. Zokaee Ashtiani*, M. Rahmani
Chemical Engineering Department, Amirkabir University of Technology, Tehran, Iran
Email: zokaee@aut.ac.ir

Abstract
Producing emulsions with nanometric drop size distribution has been considered recently in pharmaceutical, chemical, polymerization and food industries in order to improve quality and shelf life of emulsions. Also, the recently manufactured homogenizers that provide high pressures over 3500 bar (i.e. over 30 times the pressure of common homogenizer) supply the production of nanoemulsions. In this paper, studying the various homogenizer efficiency based on the results presented in literatures, showed that high pressure homogenizers like microfluidizer are so suitable option for producing nanoemulsions.

Keywords: **Nanoemulsion, Homogenizer, Microfluidizer**

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Comparison of Qualitative Methods of Risk Inspection and Analysis

M. R. Dehghani*, H. Eslami, F. Abiri
School of Chemical Engineering, Iran University of Science and Technology, Tehran, Iran
Email: m_dehghani@iust.ac.ir

Abstract
In this article the most important qualitative risk assessment methods have been compared and evaluated structurally and functionally. In this work the methods like Check- list, What-If, Failure Modes and Effect Analysis, Hazard and Operability, Fault Tree Analysis and Event Tree Analysis have been studied. In the first section, a brief description of each method has been presented then application of each one has been presented. Finally a comparison among different approaches has been executed. The results show that simultaneous utilizing of inductive and deductive methods are necessary for a reliable risk assessment. Various parameters such as budget, the time limitation, type of process and equipment type are effective in selection of risk assessment methods. Application of Check list combined with Fault Tree Analysis is the most economic approach. On the other hand HAZOP in combination with Fault Tree or Event Tree is the most reliable technique while it is the most expensive.

Keywords: **Risk Analysis, Check-list, What-if, FMEA, HAZOP, FTA, ETA**

Metal-Organic (MOF) and Covalent-Organic (COF) Frameworks: Review of Methane, Hydrogen and Carbon Dioxide Adsorption

M. Niknam Shahrak, A. Shahsavand, A. Hafizi, A. Ahmadpour*
Department of Chemical Eengineering, Ferdowsi University of Mashhad, Mashhad, Iran
Email: ahmadpour@um.ac.ir

Abstract
Storage of methane and hydrogen as clean fuels in transportation section and separation of carbon dioxide due to its destructive effects on environments, are very interesting subjects among academic and industrial researches. Storage and separation of these gases on new types of adsorbents named MOF and COF have been widely studied in recent years. Besides having several desirable specifications of conventional adsorbents (such as activated carbon), these new adsorbents are more appropriate in terms of adsorption of special gases such as methane, hydrogen and carbon dioxide. In the present paper, various types of MOF and COF and their performances in adsorption and storage of the above mentioned gases are reviewed. The ability of producing these adsorbents in our country is also discussed.

Keywords: MOF and COF Adsorbents, Adsorption, Methane, Hydrogen, Carbon Dioxide

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Usage of Bioluminescence Phenomena in Designing a Biosensor for Water Pollutant Detection

M. H. Sahraei, S. Yaghmaei*
Chemical and Petroleum Engineering Department, Sharif University of Technology, Tehran, Iran
Email: yaghmaei@sharif.edu

Abstract
Water usage in industrial process has increased attentions on detecting water pollutants. Reduction of underground water has made us to investigate new detecting and treatment methods. Biological wastewater treatments are new developed methods for industrial wastewater detecting. In this paper we are going to introduce Bioluminescence phenomena usage for wastewater detecting in a biosensor, its mechanism and its applications in water pollutant detection in all types of water. We also discuss the specific bioluminescence creatures which can be used in a biosensor for different kind of water pollution. The results declare that the usage of this method is applicable in waste water detecting.

Keywords: Bioluminescence, Biosensor, Industrial Wastewater Pollutant Detection

Kinetic Study and Investigation of Mechanisms Changes in Iso and Normal Butane Cracking over HZSM Zeolite

Gh. Roohollahi[1], M. Kazemeini[1*], A. Mohammadrezaee[2], R. Golhosseini[2]
1. Chemical and Petroleum Engineering Department, Sharif University of Technology, Tehran, Iran
2. Petrochemical Research and Technology Company, National Petrochemical Company,Tehran, Iran
E-mail: kazemini@sharif.edu

Abstract

In the present research, kinetics and mechanisms of the catalytic cracking of isomers of butane over H-ZSM-5 zeolite with was investigated. Due to the type of the cracking mechanisms which highly depended upon the various operating conditions including temperature, partial pressure and contact time of the reacting feed, the product composition was hugely variable. According to the prevailing mechanism, the reasons for this variation in the composition of the produced final product might be explained. The two mechanisms, protolytic (mono-molecular) and bi-molecular in paraffin cracking over zeolite which may occur simultaneously were proposed in paraffin cracking. The domination of each mechanism determined the final product composition and completely influenced the products spectrum. The increase in reaction temperature and feed contact time as well as; the decrease in paraffin partial pressure resulted in improvement of protolytic mechanism which ultimately raises the amount of light olefin production.

Keywords: HZSM-5 Zeolite, Catalytic Cracking Mechanism, N-butane Cracking, I-butane Cracking

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The Evaluation of Influence of Effective Operating Parameters and Determination of Optimal Condition in the Methanol Dehydration to DME Using γ-Alumina

M. Nazari, R. M.Behbahani[*], A. Goshtasbi, M. Ghavipour
Gas Engineering Faculty, Petrolum Department, Petroleum University of Technology, Ahwaz, Iran
Email: r_behbahani@yahoo.com

Abstract

In the present study, the process of methanol dehydration to dimethyl ether using acidic γ-Alumina was evaluated and operating control parameters were determined. The experiments were carried out in an adiabatic fixed bed reactor at temperature range of 250 to 380 ºC and space velocity of 15~ 45 gr.hr^{-1}/gr$_{cat}$ under pressure of 1~3 atm by the Taguchi L9 orthogonal array. The effects of each parameters and interactions were investigated by analysis of variance. The temperature and space velocity were found to be the most effective control parameter respectively. Based on the results, the maximum yield and conversion was obtained at the temperatures of 310~330 ºC and weight hourly space velocities less than 30 hr^{-1}. The interaction analysis revealed that despite the pressure has no significant effect on the reaction progress, it interacts strongly with space velocity and temperature. Also, the formation condition of methane as the main by-product was investigated.

Keywords: Dimethyl Ether, Methanol Dehydration, Operating Parameters, Optimum Condition

Performance Assessment of Fuel Cell Micro-cogeneration Systems for Residential Buildings

Sh. Hassan Begi[1], S. Rowshanzamir[2,3*], H. Ghadamian[1], M. H. Eikani[4]

1- Environment and Energy Faculty, Islamic Azad University, Science & Research Branch, Tehran, Iran

2- Fuel Cell Laboratory, Green Research Center, Iran University of Science and Technology, Tehran, Iran

3- Chemical Engineering Department, Iran University of Science and Technology, Narmak, Tehran, Iran

4- Chemical Technologies Department, Iranian Research Organization for Science & Technology (IROST), Tehran, Iran

Email: rowshanzamir@iust.ac.ir

Abstract

Micro-Cogeneration fuel cells systems technologies are small modular power generation systems that in the near future will compete with conventional methods of energy supply. A micro-cogeneration fuel cells systems have significant preference related other traditional methods by technical performance and environmental emission and only have high capital cost disadvantage. The main use of micro-cogeneration fuel cells systems is residential application. The possibility of introducing a co-generation system with a proton exchange membrane fuel cell (PEMFC) for residential use is examined by a feasibility study. First, the structure of a system is constructed by calculating heat and material balances among the system components. Secondly, a model family is constructed from the results of a questionnaire on room layout, number of family members, and the number of electric appliances and consumption of electric power in multi-family building in Iran. Thirdly, calculating the electric power and hot water demand supply balance optimizes the scale of the co-generation system with a PEM for residential use. Finally, the running costs of this optimum system using city gas are considered. The results obtained show that the micro cogeneration fuel cell systems exhibit higher efficiency (79%) for heat and electricity generation with low level of CO2 emission (23% less than conventional systems). Also, the results have shown that the fuel cell technology is not economical at present and it cannot compete with the conventional technologies. However, this option will be an economical and suitable alternative in comparison with the other conventional technologies for power generation with respect to the near future fuel cells mass production, capital cost reduction, lifetime increase, emission importance and fossil fuel price increase.

Keywords: Micro-Cogeneration Fuel Cell Systems, Combined Heat and Power (CHP), Proton Exchange Membrane Fuel Cell, Performance Assessment

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Analysis of Vinasse Sketch in Sugar Factories

M. A. Fakhari[1], M. M. Fakhari[2], E. Joudaki[3*]

1- Chemical Engineering Faculty, Engineering Department, Isfahan University, Isfahan, Iran

2- Mechanical Engineering Faculty, Engineering Department, Kashan University, Kashan, Iran

3- Chemical Engineering Faculty, Engineering Department, Arak University, Arak, Iran

Emial: e.joudaki@ippi.ac.ir

Abstract

5 % of beet that used in the sugar industries has been changed in to molasse. Molasse is full of organic and inorganic material and it is included of high rich sugar.

In Iran, some of this sugar is obtaining with the steffen method, but the waste water is produced within this method has very high PH, BOD, and more over of lime; it has sugar and non-sugar materials which is in molasse.

In addition, it is included of organic and inorganic compounds and N2. When the waste water of the sugar industry has been evacuated in to environment without any purification operation, it will putrefy, biologically and its alkali nature has been decayed soon.So that various compounds with unpleasant smells have been generated.

For the result, to prevent of evacuation pollution, in to the environment, when it isn't concentrated (Vinasse), first we must purify it biologically. In this case, for high-rich pollution, it is required to invest a large capital, although with using of vinasse method, not only the waste water can be omitted, but also we can recovery all of the organic and inorganic materials to have rich factory refuse.

In this paper, necessity of the vinasse method for environmental pollution and engineering problems have been reviewed.

Keywords: Molasse, Steffen, Vinasse

Gravity Drainage Mechanism in one of the Southern Iranian Oil Field

H. Fallah*, A. Jan Poolad , M. Afkhami Karaee, H. Ghorbani Nejad
Islamic Azad University, Firouzabad Branch, Firouzabad, Iran
Email: hooman. fallah2@gmail. com

Abstract

Here, we simulate the gravity drainage mechanism for one of the southern Iranian oil field by CMG software.
Gravity drainage simulation has been done by the immiscible gas injection in oil reservoir. When the none-wetting fluid (gas) pushes and withdraws the wetting fluid (oil) in the reservoir rock, we are faced with the gravity drainage mechanism. As we designed the immiscible gas injection in oil reservoir so the composition of oil is constant during the production under gas injection. The IMEX (CMG) has proved as the precious simulating soft ware when we are working with the black oil model.
We run the simulated model over and over in the same condition, but each time, we changed just one of the dominant parameter and find the total cumulative produced oil. In this way we could see the effect of changed factor on the cumulative oil.
The oil viscosity, the initial water saturation, the gravity force of the produced fluid (oil) and the strategy of the gas injection wells has been focused and analyzed as some of the dominant factors which affect on the total oil recovery.
By knowing these effective factors and so called knowledge, the engineers can design the better production strategies and to enhance the oil recovery.

Keywords: Gravity Drainage Mechanism, Gas Injection, Enhanced Oil Recovery, Oil Viscosity, Gravity Force, Initial Water Saturation, Injection Wells Strategy