A New Proposed Correlation for Calculating Compressibility Factor and Comparison of That with Other Correlations

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Abstract

Compressibility factor (z-factor) values of natural gases are necessary in most petroleum engineering calculations. Necessity arises when there are no available experimental data for the required composition, pressure and temperature conditions. One of the most common methods of calculating z-factor values is empirical correlation.

Firstly, a new correlation based on the famous Standing-Katz (S-K) Chart is presented to predict z-factor values. The advantage of this correlation is that it is explicit in Z and thus does not require an iterative solution as is required by other methods, so it can be utilized at PLC (Programmable Logic Controller) system simply. Secondly, the comparison between new one and other correlations is carried out and the results indicate the superiority of the new correlation over the other correlations used to calculate z-factor.

Keywords: Compressibility Factor of Gas, Explicit Correlation, Standing-Katz Chart

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Investigation of Effective Factors in Isopropyl alcohol Synthesis Process by Indirect Hydration

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Abstract

Isopropyl alcohol (IPA) is produced through different routes; there are two main commercial methods which are using propene as the starting material. The first one is indirect hydration method and using sulfuric acid as the catalyst, the second is direct hydration and using heterogeneous polymeric acid catalysts.

In this work, common method i. e. indirect hydration with sulfuric acid has been used to produce IPA. All experiments carried out in one liter high pressure reactor with propene and sulfuric acid as reactants by semi – batch process technique.

Experimental design was uni variable i. e. different acid concentration (65%, 75%, 85%, and 95%) and temperatures (25 ℃, 35 ℃, 45 ℃, and 60 ℃) by pressure 120psi studied. IPA technical grade (80%) produced in optimum condition. HNMR, FTIR and specific gravity analysis of dried sample by sodium sulfate showed that produced sample is compatible with standard. Also samples purities were determined by GC method.

Keywords: Indirect Hydration, Isopropyl Alcohol, Semi –Batch Process, Propene

Investigation of the Theoretical and Experimental Results in Ohmic Heating Methods in the Two-Phase Bio Solid-Liquid Systems

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Abstract
In this research, Ohmic heating has been introduced as a new method in heating systems for biological, food and medical industries and various commercial aspects of its for industrial application and research efforts have been studied. After introducing this heating system, present models are investigated and theoretical results in simulations and modeling cases were presented. Also, used tools and systems for this heating technique in experimental and commercial usage as an appropriate alternative for traditional heating method were fully explained. Finally challenges related to development of this method are expressed.

Keywords: **Ohmic Heating, Electrical Conductivity, Food Industry, Pharmaceutical, Modeling and Simulation**

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Adsorbent Materials Commonly Used for Separation of Carbon Dioxide from Flue Gases – A Short Review

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Abstract
In this work, some adsorbents that are used to separate carbon dioxide from flue gases, are investigated since much of carbon dioxide as air pollutant released to the atmosphere is from flue gases. Different types of activated carbons, Zeolites, MCMs, HTlcs, Metal oxides and carbon nanotubes are among the adsorbent that are investigated extensively by scientists. At high temperature and atmospheric pressure, basic alumina and HTlcs show suitable results. Under the same conditions, activated carbon has also shown medium adsorption. Also, impregnation of activated carbon by basic reagent increased carbon dioxide adsorption. Although, activated carbon at high temperature has less uptake than basic alumina, the adsorbent price, availability of raw material and a medium level of adsorption, make activated carbon is more suitable than other adsorbents. Also it is important to consider the type of raw material and activation and impregnation methods that can affect the level of uptake.

Keywords: **Carbon Dioxide, Flue Gases, Adsorption, Adsorbents, High Temperature, Atmospheric Pressure**

A Review on Nano-Composite Membranes: Their Synthesis Routes and Applications for Membrane Based Gas Separation

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Abstract

The application of membranes in the separation processes has been increased due to their advantages, such as: lower power consumption, easy separation, accessibility of the separated phases and less environmental problems. Research in the field of membranes and membrane separation processes is in progress. New ideas in this field consist of synthesis and characterization of nanocomposite membranes. The nanocomposite membranes have been more efficient than other membranes due to their unique structural properties. In general, nanocomposite membranes are classified into two categories: organic and inorganic. Inorganic nanocomposite membranes are polymeric membranes in which nanosize inorganic fillers are added to improve their thermal stability and permeability. These membranes enjoy high industrial capabilities. Nanocomposite inorganic membranes are in fact used to eliminate the structural and surface defects of traditional inorganic membranes, among which are the two-fiber membranes of carbon-zeolite and alumina-zeolite. In this article, a comprehensive review has been presented about the classification of nanocomposite membranes and their synthesis routes in the gas separation processes. Finally, the future and prospects of nanocomposite membranes application have been discussed.

Keywords: **Nanocomposite Membranes, Gas Separation, Membrane Synthesis**

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Thermodynamic Hydrate Inhibitors for Preventing of Gas Hydrates Formation in Gas Pipeline Transmission

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Abstract

Gas hydrates are ice-like crystalline structures but they are different from ice. They form in high pressures and temperatures above water freezing point.

Hydrate formation in the gas transmission pipelines may lead to interrupt in gas transmission and pipeline blockage. Because the cost of pipeline blockage is high and time consuming operation. Chemical inhibitors are commonly used in order to prevent the hydrate formation in gas pipelines. These inhibitors are divided into thermodynamic inhibitors and kinetic inhibitors. Thermodynamic Hydrate inhibitors would be explained in this paper. Thermodynamic Hydrate inhibitors effects on water chemical activity and causes the hydrates to form at higher pressure and lower temperatures.In this paper, related equations to Thermodynamic Hydrate inhibitors, gas pipelines operational data's applications, using these data's in related equations and finally verifying the obtained results have been accomplished. It is shown that Methanol is the best inhibitor.

Keywords: **Gas Hydrates, Thermodynamic Hydrate Inhibitors, Subcooling, Gas Pipeline Transmission, Methanol**

The Study of Water Molecules Collection and Interaction Within Carbon Nanotubes Using Molecular Dynamic Simulation

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Abstract

Molecular Dynamic Simulation is a simple tool to investigate the molecular properties of the nanoscale systems. One of the most popular systems that is widely considered is Carbon Nano Tubes CNT immersed in water. In this research, NVT & NPT simulations are applied to study water molecule collections within CNTs' as well as the effect of pressure on them. Results showed that water molecules can not enter CNTs' of less than 6.78 Angestrom diameter. Also the current work confirmed the positive effect of pressure on water molecules' collection within CNTs.

Keywords: Molecular Dynamic Simulation, Carbon Nanotube, NPT and NVT Simulations

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An Overview of Enzymatic Production of Biodiesel

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Abstract

Among the most critical issues in production of environmental friendly fuels, biodegradability, low toxicity and renewability are the most important factors. Biodiesel, as a renewable fuel can be produced from various sources including vegetable oils, animal fats, waste products of vegetable oil refinery and used frying oil. Chemically, biodiesel is known as monoalkyl ester of fatty acids. Transesterification is a common way to produce biodiesel. Transestrification method involves chemical (acidic or basic) or enzyme catalyzed reaction to produce fatty acid alkyl esters. Enzymatic biodiesel production involving lipase catalyzed reaction is a well known method for biodiesel production. This paper provides an overview on the enzymatic production of biodiesel. First, a brief description about common methods of producing biodiesel has been given and then, the enzymatic reaction and process is explained in particular.

Keywords: Biodiesel, Esterification, Enzyme, Lipase

Simulation of Methanol Production Process and Determination of Optimum Conditions

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Abstract

Methanol is one of the most important petrochemical products, which is produced extensively in the world. Recently it has used methanol to olefin plants for production of synthetic fuels. In this paper, methanol process based on Davy Mc Kee Corp., in steady state condition, has simulated using HYSYS simulation software. Finally, the results has compared with practical process data. After validation of simulation basis and its results, it has utilized for process optimization in order to reducing greenhouse gases and energy consumption.

Keywords: Methanol, Davy Mc Kee, Simulation, Optimization