

Study of Calculation Methods of Fugacity of Water in Gas Hydrate

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Abstract

For study of equilibrium conditions of systems that consists of gas hydrate, different models were needed to calculate fugacity of each component in different phase like gas, liquid, solid. By using equation of state and proper mixing rules, fugacity of components can be calculated for gas and liquid phase. But for solid phase, there aren't different models. The first model proposed by Van der Waals and Plateau. The basic idea of this model based on similarity between gas hydrate formation and adsorption process. Parrish and Prausnitz assumed that the hydrate formation from ice. Sloan and Ballard considered the amount of changes in volume during hydrate formation, because of guest molecules. Kluda and Sandler assumed a multi layer potential function for molecular forces. This paper is a general review of models in detail.

Keywords: Fugacity, Gas Hydrate, Equilibrium



Investigation of segregation in solids mixing

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Abstract:

Final quality of a mixture is determined by relative importance of mixing and segregation. To obtain the best result for process of mixing, it is necessary to minimize segregation. In this review paper, effective factors in segregation phenomenon are introduced, and its mechanisms are presented. Some concepts such as intensity of segregation and scale of segregation are explained. Meanwhile, available methods for measurement of segregation are presented. Finally, to obtain a mixture with a good quality, methods to decrease segregation phenomenon are revealed.

Keywords: Solids mixing, Segregation, Mechanisms of segregation, Indexes of segregation, Methods for reduction of segregation

The investigation on penicillin production and product purification

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Abstract

Growth and penicillin biosynthesis by two strains of penicillium chrysogenum; PTCC 5031, PTCC 5033, in synthetic media were investigated. Experimental efforts have been made to determine the biomass and penicillin yield in shaking flasks and fermentor with glucose and lactose as carbon sources. Lactose is fermented at a much slower rate, but it is a better sugar for penicillin production. The ratio 3:1 of lactose:glucose has been determined for the optimum media. As the strain PTCC 5031 produce 4 times greater than the other strain, it was determined as the best strain. A novel three-liquid-phase extraction system consisting of butyl acetate, poly ethylene glycol, ammonia sulfate and water has been studied. In this stage nearly 80% of Penicillin has been recovered. In the case of optimization the process the factors affecting penicillin extraction including initial concentration of phase-forming components, PEG molecular weight, pH and initial concentration of penicillin have been investigated. Penicillin G preferentially were partitioned into the middle phases with increasing initial concentration of phase forming components in such system. It is desired to enhance penicillin partition into the top phase. This is possible by pH decreasing.

Key words: Penicillium chrysogenum, penicillin, production, extraction, optimization.



Feasibility study of using Heat Pipe Heat Exchanger in air condition system for Energy saving

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Abstract

This paper with thermodynamics laws shows that heat pipe heat exchangers are very satisfy for preheating and precooling in air conditions system .If an air conditioner fails to lower the humidity adequately, the air will be cool, but will feel uncomfortably damp.

One technology that addresses this problem is the dehumidifying heat pipe, a device that enables an air conditioner to dehumidify better and still efficiently cool the air. The heat pipe is ideal for hot, humid environments.

A dehumidifying heat pipe resembles two heat exchangers, located on either side of the air conditioner's evaporator coil. Several tubes connect the two sections. A refrigerant inside the tubes pre-cools the incoming supply air by absorbing the heat from it. This causes the refrigerant in the tube to evaporate. Although the heat pipes don't use any electricity directly, they cause the conditioned air to leave the system slightly warmer than it would have in the absence of the heat pipe, so it takes more energy to cool your home. The system also consumes more fan power to blow air past the heat pipe. However, the manufacturer claims that your thermostat can be set higher with the low humidity air, allowing a net energy savings. In precooling and preheating side, we have 10 & 50 percent saving of energy with HPHE.

Keyword:Heat pipe heat exchanger, Air condition, Energy saving-Thermosyphon, Humidification

Increasing Translucency in Tableware by Using Feldspar

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Abstract :

Tableware is a white and dense body that produced by three basic raw materials like silica, feldspar and kaolin. Each of them has an effect on module of rapture, translucency and whiteness. Translucency imply to passing light through body and best way to achieve it, is producing a fused phase without any crystal and porosity that have different diffraction factor. To design a best composition, we should mix this material to reach essential properties for producing tableware in production line as biscuit, fired and green module of rapture, shrinkage and resistance to deformation besides the other properties we said. In this paper to achieve the highest Translucency we used Marand Washed kaolin, Mallayer Silica and Hamedan Feldspar and fixed clay content at 65% and changed silica and feldspar content then provided different composition and measure all properties by physical experiment, Scand picture(SEM), X-ray diffraction. Colorimeter and light transition measurement Results show in 20% silica and 15% feldspar composition we can have a fused phase with minimum crystal phase and porosity that lead to maximum light transition besides other essential properties.

Keywords : Tableware , porcelain , translucency , feldspar, transition



Evaluation of Novel and Developed Technologies on Synthesis Gas Production for Gas-to-liquid (GTL)

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Abstract

Gas-to-liquid (GTL) is attracting attention as a promising area for future development in the energy sector. Proven technology is available, and several large projects are in advanced stages of development for diesel or methanol production. The preparation of synthesis gas is the most capital-intensive part of a GTL-complex. Hence, there is a considerable incentive to optimise and further develop syngas production technologies for the purpose of cost reduction. This paper tries to answer which technology will be dominant during the next decades with consideration of the technical and economical aspects. Investigation on this subject shows that ATR technology holds promises for significant, further improvements, both as a stand-alone technology and in combination with HTER in series arrangement.

Keywords: Gas-to-Liquid (GTL), Auto Thermal Reforming, Catalytic Partial Oxidation, Ceramic Membrane Reforming (CMR).

Determining of affective parameters in SrCO₃ production from mineral Celestine and their applicable modeling

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Abstract

Our country has many mineral sources such as mineral Celestine and on the basis of estimations, the capacity of this sources are containing more than two million tons with 75-95 percent purity of strontium sulfate. Strontium sulfate has not any high-level consumption in industries, but it has a huge consumption in the form of strontium carbonate in many industries such as Color Cathode Ray Tubes (CRT), pyrotechnical process, ceramics, paint production, zinc purification process and etc. In this research work, SrCO₃ producing from Celestine mineral is analyzed and many important parameters including process temperature, residence time, feed particle size distribution and the effect of excess coke on strontium carbonate conversion are determined. Finally, with affective parameters modeling, optimized conversion of reaction 72% is achieved.

Key words: Celestine, strontium carbonate, process parameters, optimized parameters modeling.



The Effect of Activation Parameters on the Adsorption Ability of Activated Bentonite

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Abstract

In this work a sodiomic bentonite clay from Shahre-Babak was activated with H₂SO₄ at 90°C. The aim of the study was to determine the effect of three parameters i.e. activation time (t), acid concentration (%acid) and Liquid/Solid ratio (L/S) in the activation suspension, on the adsorption ability of acid activated product. Chlorophyll removal from edible oil was chosen as an adsorption criterion. We traced the Chlorophyll concentration in the bleached oil and consequently the best arrangement of the above parameters was found. The results demonstrate that the most activated product will not necessarily produce due to maximum severity of activation condition.

Keywords: Acid activation, Activated bentonite, Adsorption.

Pore Network Modeling of Biofilter for Treatment of Gas Streams Contaminated with Aromatic Compounds

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Abstract

Biofiltration is one of the most effective biological methods for treatment of polluted air stream containing low concentration of pollutant. The efficiency of this process mostly depends on the pore spaces structure in the biofilter medium. The previous models for this process were based on the transport and reaction equations in the continuum systems, not considering the effect of the pore spaces morphology, pore size and connection type. In this work, treatment of air stream contaminated with TEX (toluene, ethylbenzene and xylene) was modeled using 3D pore network model and the effect of increasing biofilm thickness on the pore spaces morphology was considered. This model predicted the effect of biomass growth on bed clogging, flow channeling, and consequently on the pressure drop increasing and pollutant removal efficiency decreasing. Comparison between model results and experimental data show the reasonable agreement.

Keywords: Biofilter, Modeling, Pore network model, Biomass growth, TEX.