Determination of Optimum Reservoir Parameters in Coalbed Containing Methane for Enhanced Recovery Operation Via Carbon Dioxide Gas Injection

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Abstract
Many parameters affect the efficiency of enhanced recovery operations in methane-containing coal beds. Some of the most important parameters in this research were studied. The best output for performing enhanced recovery of these parameters was obtained in ECLIPSE reservoir simulation software. After selecting the data for sensitivity analysis, the corresponding models were defined with different conditions. Then the results of this simulation were analyzed. Sensitivity analysis indicators include the amount of produced carbon dioxide, as well as the rate of this product plus the amount of carbon dioxide stored in the reservoir which is important for the oil and gas industry from the environmental point of view . According to the results of the sensitivity analysis in line with the studied parameters, it can be stated that if the permeation parameters and the porosity of the slit system be lower than a certain extent, they will lead to failure in the process of enhanced recovery. Meanwhile, the other three parameters, reservoir pressure, Langmuir pressure, and Yang coefficient, only affect the efficiency of the enhanced recovery operation .

Keywords: Coalbed Reservoirs, Methane, Enhanced Recovery, Reservoir Parameters, Carbon Dioxide.

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Different Sulfur Recovery Options; Applicability, Advantages and Disadvantages

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Abstract
Environmental regulations have become more stringent on acid gas emissions to atmosphere. So, selecting the right process for sulfur recovery from refinery acid gases is very important. In this manuscript, different technologies for sulfur recovery have been reviewed and their advantages and disadvantages have been investigated. Selecting suitable technology depends on different parameters such as unit capacity, the feed composition, required recovery, operating condition and economy. The results of this study show that to obtain sulfur recovery about 97% at refineries with high capacity, the modified Claus process is the best choice. To achieve more recovery, one of the tail gas treatment technologies should be applied after Claus process. These technologies include sub-dew point, direct oxidation, converting sulfur species to H_2S and absorb with selective amine, converting sulfur species to SO_2 and absorb with suitable solvent. This study revealed that to increase sulfur recovery to more than 99.9%, the best choice is selective absorption of hydrogen sulfide with amine and recycling it to the Claus process.

Keywords: Sulfur Recovery, Tail Gas Treatment, Efficiency, Technologies.

Investigation of Printed Heater Fabrication by Using Nano Graphite and Nano Copper

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Abstract

In this study the fabrication of printed heaters using conductive film prepared by nano graphite and nano copper was investigated. One of the features of this heater, is high stability and low energy consumption, which makes it possible to build a heater by producing high temperature. Initially, nano copper was produced by using the polyol method, in which polyvinylpyrrolidone was used as a protective agent. According to the scanning electron microscopy(SEM) analysis, the copper nanoparticles had a size range of about 35±9 nm. The copper particles were confirmed by XRD to be crystalline copper with a face-centered cubic (fcc) structure. In addition, graphite, 1-methyl-2-pyrrolidinone (as film solvent) and copper nanoparticles (to increase film conductivity), a conductive film with a weight percentage of 60.21% was prepared. The optimum film resistivity, which was printed as a conductive film on the glass surface with dimensions of 10 x 1 cm, and dried by the oven at 170 °C, was 126.8 ohms. Finally, when the film was connected to a 24 V supply, temperature of the film increased to200°C. Due to its stability and uniform heat, the heater can be used in the electronics industry.

Keywords: Copper Nanoparticle, Graphite, Printed Film, Polyol Method.

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A Review on the Silica Aerogels-Supported Catalysts

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Abstract

Silica aerogels are attractive candidates as catalyst support due to their very large surface area and high open porosity. This paper reviews the silica aerogel supported catalysts. General methods of silica aerogel synthesis and catalytic phase incorporation into aerogel matrix described. Aerogel synthesis consists of two main steps: wet gel preparation and drying the gel to obtain aerogel. Catalytic active phase can be added before or after silica gel formation. In the first approach, active phase precursor or as-prepared nanoparticles added to silica precursor. Active phase introduced into matrix structure during the gelation of matrix. In the second approach, active phase either impregnated on the silica wet gel or deposited on the aerogel by impregnation or vapor infiltration. Aerogel catalysts synthesis and aerogel drying methods, and used silica precursor as well as the studied reactions in the catalytic application of silica aerogel have been collected. Finally, a comparison between the properties and performance of the aerogel and xerogel catalyst have been presented which results confirm the favorable properties and better performance of aerogel catalysts in comparison with xerogel catalysts. As typical results in different studies, for aerogel catalyst the specific surface area up to 3.9 times larger, the pore volume up to 23 times larger, the reactant conversion up to 7.5 times larger, the product yield up to 7 times larger, and the desired product selectivity up to 4 times larger than those for xerogel catalyst have been obtained.

Keywords: Aerogel, Catalyst, Synthesis, Properties, Performance.

A Review on Effect of Clay Nanoparticles on the Stable and Dynamics Rheological Properties of Polymeric Nanocomposites

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Abstract

Polymeric nanocomposites are one of the most diverse today's materials and have unique properties, but a polymer alone is not capable of exhibiting a wide range of desirable rheological properties. Therefore, for development and high efficiency of these nanocomposites, the need to merge these composites with materials such as clay nanoparticles that is one of the most commercial and effective nanoparticles. So, in this study, a review on previous researches has been performed to investigate the effect of clay nanoparticles on polypropylene/clay nanocomposite rheological properties of immiscible polymeric mixtures. Based on the studies, it was found that for the poor interactions of polymer/clay nanoparticles composites and in systems where the dispersion of nanoparticles was less stable, the addition of layer silicates had minimal effect on the rheological behavior of the nanocomposites. For the strong interactions of polymer/clay composites, a transition from rheological behavior of liquid species to solid species behavior is observed at relatively low amounts of silicate (1–2 wt.%). Studies show that clay nanoparticles contribute to the development of fuzzy morphology by increasing the viscosity and elasticity of the polymer matrix.

Keywords: Nanocomposite, Clay Nanoparticles, Polypropylene, Rheological Properties, Elastic Modulus.

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Effect of Methyl and Fluorine Grafted Silica Nanoparticles on the Performance of Polypropylene Membrane Contactors

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Abstract

The use of membrane contactors for acidic gases purification is one of the important advances in engineering processes and environmental protection. Despite the many advantages of membrane contactors, the wetting of membranes is the most important problem in developing this technology. In order to reduce the wetting problem of membranes, in this work, super hydrophobic polypropylene hollow fiber membranes were prepared and their structure and performance were evaluated by various tests. The results of the contact angle measurements showed that for the membranes coated with methyl and fluorine functional group the contact angle increased to 162° and 155°, respectively. The results of Wilson's plot also showed that the mass transfer resistance of pure, methyl-coated and fluorine-coated membranes was 30.78%, 18.79% and 22.45%, respectively. Therefore, methyl-coated membranes have a high potential to be used in membrane contactors.

Keywords: Polypropylene, Coating, Superhydrophobic**,** Membrane Contactors, Wilson's Plot**.**