Production Data Analysis in Hydrocarbon Reservoirs: A Case Study

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Abstract

Proper evaluation of any hydrocarbon reservoir requires knowledge of information such as hydrocarbon in place, recoverable reserve and average reservoir pressure. Production data analysis techniques are regarded as one of the best engineering tools for estimating such parameters. These methods, which are empirical and analytical, are normally applied in a systematic manner to analyze well data. All of the methods (Empirical, semi analytical and analytical) use well production rate as the input data. The well pressure-rate data of specific wells are analyzed to determine reliable estimates of reservoir parameters and also to predict well production performance. This paper categorizes the existing methods and study strengths and drawbacks of each method.

Keywords: **Production Data Analysis, Reservoir, Hydrocarbon in Place, Type Curves, Recoverable Reserve**

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Regeneration of Pt-Re/Al_2O_3 Catalyst (Used for Reforming of Heavy Naphtha) in the Laboratory Scale

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Abstract

The purpose of the catalytic reforming process is the production of high octane number gasoline which is a strategic and economic in the trade market. In this research, the regeneration of commercial Pt-Re/Al_2O_3 catalyst used for catalytic reforming of heavy naphtha is studied in the laboratory scale. This catalyst is unloaded from a fixed-bed reactor located in an Iranian refinery, and is at the end of its cycle life (about 2 years). After loading the catalyst in the laboratory scale, for performing the regeneration process, the coke on the surface of the catalyst is burned with the dry air. Then, chlorination process is carried out for the re-dispersion of chlorine agent on the catalyst surface. Finally, the catalyst is reduced and sulfided using hydrogen and H2S streams, respectively. During the regeneration, the flow rate, temperature and pressure of process are meticulously controlled, and also the optimized values are chosen to have the best regeneration. The results show that the regenerated catalyst, according to the recommended method in this research, has the capability of producing gasoline with the octane number higher than 100 which is approximately similar to the gasoline produced by the fresh commercial catalyst.

Keywords: **Catalytic Reforming, Regeneration, Heavy Naphtha, Octane Number, Catalyst Reduction**

CFD Simulation of Gas-Particle Helical Separator

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Abstract

In this study, the turbulent gas-particles multi phase flow through the helical coil separator has been simulated by CFD techniques. Eulerian-Eulerian approach was used for multi phase flow simulation. For validation, the friction coefficient gaining from CFD simulation was compared with experimental values. The results showed that the RSM and RNG k-ε turbulence model and wall function model and second upwind method for solving partial differential equations are most appropriate method for simulating two-phase flow through ahelical channel. Finally, the influence of solid load in the gas flow, particle size and flow rate on the separation efficiency and pressure drop were investigated.The results showed with increasing of solid loading, the efficiency of cyclone decreases. The simulations have been done for particle size up to 16 micron, the results present the variation of efficiency is not significant (close to 100%) for particle size bigger than 6 micron. Also it was observedthe appropriate inlet velocity for efficient performance of cyclone is between 5-10 m/s.

Keywords: **Gas-Particle Flow, Helical Coil Separator, CFD Simulation**

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Experimental Study of Wettability Alteration of Porous Media by Silica Nanoparticles

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Abstract

Increasing of world demand for energy requires the increase in production of crude oil. Therefore, innovative enhanced oil recovery (EOR) methods have been the subject of many different kinds of studies. The use of nanotechnology has recently gained momentum in the oil and gas industry for its potential applications in EOR processes. Nanoparticles affect the wetting conditions of porous media which is a key factor in displacement efficiency. However, the effect of nanoparticles on wettability of porous media remains still little understood in the available literatures. In this work, the effect of hydrophilic silica nanoparticles on wettability of reservoir rock has been investigated. Contact angle of oil droplets in oil/water/rock system was used as an index of wettability conditions of surfaces. Obtained results revealed that the wettability of oil-wetted rocks in presence of silica nanoparticles changes from oil-wet to water wet; moreover, by increasing temperature and concentration of nanoparticles, the wettability alteration occurred in much less time. Finally, using micromodel setup some flooding tests has been performed in one-quarter five-spot glass micromodel to evaluate the effect of silica nanoparticles on sweep efficiency of water flooding process.

Keywords: **Wettability, Contact Angle, Reservoir Rock, Silica Nanoparticles, Enhanced Oil Recovery, Experimental**

The Influence of Fluorine on the Corrosion of Kiln Equipment in Molten Glass

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Abstract

Cord which is introduced in Glass- Ceramic products as Non- homogenous glass can observe as dark spot in glassy body and can have different causes like Non-homogenous raw material. To research the reason of this non- homogeneity some sample from kiln equipment (Electrodes – wall brick) and dark spot and glassy body has been tacked and analyzed. results showed that the fluorine used in Glass-Ceramics is the main reason for kiln equipment corrosion and cord formation. Therefore a alternative for fluorine should be find in glass-ceramic as a crystallizer.

Keywords: Cord, Glass-Ceramic, Fluorine, Corrosion

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Catalysts for Synthesis of Biodiesel: A Review

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Abstract

Because of the increasing demand for energy in the world, on the one hand, and limited sources and environmental subjects about fosile fules one the other hand in recent years, many studies have been conducted in different countries in order to provide a good source of alternative fuel. Among the different fuels, biological fuels (biodiesel and bioethanol), one of the most desirable alternative materials have been introduced. Biodiesel as a green fuel (Mono Alkyl ester) is a clean fuel that is produced from renewable natural resources such as oil seeds, plant oils, algae and food waste. Type and conditions of selection process for biodiesel production, is a function of feed intake, production capacity and position in a manufacturing process, and so on. Catalysts play an important role in the biodiesel production process. In recent years, the increasing demand for biodiesel, the goal is to find ways to make the economics of biodiesel production, increased efficiency of the production process as possible, and at the same time, the properties of biodiesel produced in accordance with standards available. The best and most practical research, is the catalyst of process. This paper examines the role of catalysts used in biodiesel production and research in this field has been investigated.

Keywords: Biodiesel, Biofuel, Transesterification, Catalyst

Investigation of the Effect of Drilling Mud Pressure on the Stability of the Walls of the Directional Well in the Southern Iranian Oil Field–Cheshmeh Khosh

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Abstract

Rapid increasing demand for energy necessitates the development of oil and gas fields in a more accurate and reliable method which includes the optimization of drilling and production operations in conjunction with enhanced oil recovery methods. The technique of directional drilling plays a significant role in this regard and affects the drilling performance and producing wells. Prevention of the destruction and damages on the walls of the well is an important task including the selection of the optimal pressure of drilling mud to be injected.
In this study we investigated and modeled one of the directional wells in the Southern Iranian oil field-Cheshmeh Khosh; which includes the determination of the role and effect of drilling mud pressure on the extent of formation damage. The results of the study show that optimal injection pressure of 60 Mpa give better out comes specifically reduces the displacement of points on the walls.

Keywords: **Drilling Mud, Directional Well, Stability of Well's Wall, Pressure of Injecting Mud, Formation Damage, Optimum Pressure, Exploitation Factor**

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Experimental Measuring Methods and Modeling of Density and Viscosity of Alkanolamine Solutions and Liquid Solvents

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Abstract

Alkanolamine solutions are extremely used in acid gases treatment in gas and oil refineries. Thermal and physical equilibrium and transport properties such as density and viscosity of loaded and unloaded alkanolamine solution have significant role in process designing of striping units and also in software simulation designing of absorption and desorption amine units. In this work, all experimental methods of measuring the density and viscosity of amine solution and models presented in literature are summarized and density and viscosity of pure and aqueous solution of N,N-dimethylformamide (DMF) at the entire range of composition and atmospheric pressure are measured at the temperature range of (303.15 – 333.15) K. Excess quantities of those mentioned properties were obtained and modeled by using Redlich-Kister equation.

Keywords: **Alkanolamine Solutions, Physical Solvents, Transport Properties, Density Coefficient, Viscosity, Acid Gases**

Simulation, Equipment Design and Economic Estimation of PVC Process

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Abstract

Polyvinyl chloride was discovered in the late nineteenth century, but until 1920s, it was not commercially produced and marketed. This polymer has high consumption rate in the world after polyethylene and it can be rigid or flexible, opaque, transparent or colored and insulating or conducting. Depending on the type of polymer, polyvinyl chloride is produced by various methods, including suspension, emulsion, solution, microsuspension. Suspension polymerization of monomers is used in most cases like suspension of particles in water. This article introduces the chemistry of the polymerization reaction and after presentation of different production methods, economic cost evaluation of the unit is discussed. In order to economic estimation of the plant, obtaining input and output flow rates and calculated size of all equipment are required. Therefore, to obtain the mass flow rates, the process simulation is carried out. In this study, production process simulation is performed by ASPEN POLYMER PLUS software. Then final equipments' prices and economic estimation of plant are calculated by taking equipments' size in to consideration. Results show that for a PVC production unit with a capacity of 45,000 tons per year, the fixed capital and operating capital are equivalent to 18,275,000 and 2,742,000 dollars, respectively.

Keywords: **Polyvinyl Chloride, Economic Estimation, Simulation**