Application of Exergetic Efficiency and Yield for Determination of Performance of Absorption Heat Pump

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Abstract

Recovery and reuse of lost energy by absorption heat pumps which can produced useful heat and cold, are one of the main method to overcome energy needs. For optimum application of absorption heat pump, the conventional criteria which are based on principles of thermodynamic laws, should be changed and suitable criteria should be defined consequently. In this paper, at first, the absorption heat pump considers as exergetic dipole/quatrepole and then, performance criteria and correlations of the heat pump have been illustrated. A case study showed that, exergetic efficiency and yield as novel criteria, can illustrate absorption heat pump performance with good precision.

Keywords: Absorption Heat Pump, Exergy, Performance, Efficiency, Pole

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Evaluation of Presented Relations for Pressure Drop Calculations in Styrene Monomer/Ethylbenzene Packed Distillation Columns

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Abstract

Polymer production is one of the important problems in packed distillation columns. Low pressure drop or additions of inhibitors for reducing polymer production are suitable methods for prevention of undesirable phenomena. Because of deep relation between polymerization, inhibitors and pressure drop, present research was introduced in three parts. In first step, different packing types that are used in styrene monomer / ethylbenzene separation columns are discussed. Secondly, commercial inhibitors used in these columns were discussed. Different researches have been performed for estimating pressure drop in styrene monomer packed columns. Bravo (1989) and Stichmailer (1997) relations are examples of them. In this investigation pressure drop was calculated by these relations and their advantages were presented. As a result, Bravo and Stichmailer relations have good accuracy in columns with high diameter, low pressure drop and low bed height. For other conditions, Stichmailer relation has suitable and use of Bravo equation led to high errors in estimation of pressure drop.

Keywords: Styrene Monomer, Ethylbenzene, Packed Columns, Polymerization Inhibitor, Pressure Drop

Experimental Investigation of Determining Optimum Pressure for Wellhead Separators

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Abstract

Since the first stage of process on petroleum fluids are occurred in the separators, appropriate design of separators are quite important. One of the parameter that has influence effect on performance of separators is determination of optimum pressure for these vessels. In this paper, by using the " Raska Flash Equilibrium Separator", "gasometer" and "densimeter" apparatuses, gas oil ratio, oil formation volume factor (B_o) and API gravity are calculated at different pressure for one of the Iranian South West oil sample. By comparing the result that obtained for above parameter the optimum pressure determined and was shown the rate of oil production is affected by optimum pressure.

Keywords: Optimum Pressure, API Gravity, Gas Oil Ratio (GOR), Oil formation Volume Factor (B_o)

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Selection of Optimal Method for Removal of Volatile Organic Compounds from Industrial Polluted Gas Streams II: Non-Destruction (Recovery) Methods

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Abstract

Volatile organic compounds are among the most common air pollutants emitted from chemical and petrochemical industries. For the reason that these compounds can cause various hazards for the environment, removal of these pollutants seems to be very necessary; on the other hand, these VOCs have good commercial value and can be recovered. In this research, various available VOCs removal and recovery techniques as well as their advantages and disadvantages were investigated and optional methods for different conditions have been suggested. Among these methods adsorption, condensation and absorption have been considered as useful methods for recovery of VOCs.

Keywords: Volatile Organic Compounds (VOC), Absorption, Adsorption, Concentration, Condensation, Membrane

Characteristics of Cement Mortar with Nano-SiO_2 Particles

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Abstract

The properties of cement mortars with nano-SiO_2 were experimentally studied. The amorphous or glassy silica, which is the major component of a pozzolan, reacts with calcium hydroxide formed from calcium silicate hydration. The rate of the pozzolanic reaction is proportional to the amount of surface area available for reaction. Therefore, it is plausible to add nano-SiO_2 particles in order to make high-performance concrete. The experimental results show that the compressive strengths of mortars with nano-SiO_2 particles were all higher than those of mortars containing silica fume at 7 and 28 days. It is demonstrated that the nano-particles are more valuable in enhancing strength than silica fume. In addition, the continuous hydration progress was monitored by scanning electron micrograph (SEM) observation, by examining the residual quantity of $Ca(OH)_2$ and the rate of heat evolution. The results of these examinations indicate that nano scale SiO_2 behaves not only as a filler to improve microstructure, but also as an activator to promote pozzolanic reaction.

Keywords: **Nano-SiO_2 Silica Fume, Compressive Strength, Micro-Structure, Filler, Activator**

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Principles, Advantages and Applications of Impinging Streams Reactors (ISR_S): A Review

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Abstract

In this article the previous and recent researches on Impinging Streams Reactors (ISR_S) are briefly reviewed. Some basic principles of ISRS are first reminded and their applications in combustion, gas-solid, gas-liquid and liquid-liquid processes are discussed in details. Also actual advantages and limitations of such systems are presented. Results show that ISRS are high intensity reactors which provide significant improvement over conventional phase contacting equipment due to the impingment of high velocity feed streams upon each other in relatively small reactor volume, resulting in a higher turbulent mixture of phases. Also due to this intimate contact between phases, mass and heat transfer rates are increased dramatically. Because of above mentioned advantages and in spite of some limitications, it seems that, the similar conventional systems, are replaced by these type of reactors in near future.

Keywords: **Impinging Streams Reactors, Gas–Solid processes, Gas–Liquid Processes, Liquid–Liquid Processes, Heat & Mass Transfer Coefficients**

Self-Propagating Method and its Role in Environmental Protection

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Abstract

The self-propagating high-temperature synthesis (SHS) method have been developed Through The world-wide in order to production of beneficial engineering and other functional materials, such as advanced ceramics, intermetallics, catalysts and magnetic materials. This method uses self-sustaining solid-flame combustion reactions which develops very high internal material temperatures during very short periods. Therefore, has many advantages over traditional methods, such as much lower energy costs, lower environmental impacts, ease of manufacturing and capability for producing materials with unique properties and characteristics. This paper introduces the SHS method and its advantages and discusses a numerous applications with environmental Trends, such as highly active catalysts for exhaust emission control and methane conversion and various methods of neutralization or recycling industrial inorganic wastes. Since SHS can be initiated and completed at Environmental standard conditions, it can also be utilised successfully for dealing with toxic or radioactive materials and contaminated areas by creating large-scale protective coatings or vitrification, consolidation and encapsulation of dangerous wastes.

Keywords: **Self-Propagating Synthesis, Catalyst, Environment, Waste**