

Evaluation of Electrolysis Extraction Role on Titanium Production

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Abstract

Titanium is a strategic metal. Production of this metal by Croll process is a reason of the expensiveness of this metal. Researchs on the replacement of old process caused to invention of a new method on the basis of electrolysis for Ti production from TiO_2 . This process (called FFC) can be used for production of some other metals from their oxides. In this papers this process is studied on the basis of a basic view. These new process have considerable importances with respect to the discussion of Ti production in Iran.

Keywords: Titanium, Croll, Electrochemistry, FFC



A Neural Network Approach for Identification and Modeling of Delayed Coking Plan

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Abstract

In this study, an artificial neural network (ANN) modeling of a delayed coking unit (DCU) is proposed. Different data from various DCUs have been collected. Feed API and cat cracker (CCR) weight percent have been considered as network inputs. Coke, output CCR, light gases, gasoline, gas-oil and C_5^+ weight percents are the network outputs. 70 percent of the data have been used for training of ANNs. Among the multi layer feed forward architectures a network with 31 hidden layer neurons has been implemented. Radial basis function (RBF) also has been implemented for identification of the unit. An RBF network with 20 spread was found as best estimator of the DCU in this paper. Best RBF network and best feed forward network performance in prediction for 30 percent of unseen data were compared finally. RBF method had the best generalization capability and was used for DCU modeling.

Keywords: Delayed coking unit, Artificial neural network, Modeling

Application of Multifunctional Catalysts in Singlewall Carbon Nanotube Synthesis

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Abstract

In the present paper a review has been presented on the properties and applications of some monometallic and bimetallic nanoparticles as catalysts in production of single-wall nanotubes. An emphasis has been made on cobalt monometallic and cobalt/nickel bimetallic nanocatalysts due to their extensive use and special behavior. The patterns of behavior of the latter have been investigated by EXAFS spectroscopy, SEM and TEM analysis. Finally, the properties of monometallic nanoparticles have been compared with those of bimetallic particles.

Keywords: Monometallic nanoparticles, Bimetallic nanoparticles, SWNT, Spectroscopy



Production of Synthetic Rutile by ERMS Process

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Abstract

Synthetic rutile is the raw material for titanium metal and titanium dioxide production. Several processes have been developed to produce synthetic rutile, from which the most commons are Benelite, Becher and ERMS. As a consequence of technical and economical benefits, ERMS is known as the most efficient method and as a technical option for Processing of ore and concentrate of Kahnooj titanium deposits.

This paper is aimed to introduce ERMS process for synthetic rutile production and to compare it with common methods. From the results of this study it can be pointed out that ERMS process could be considered as an alternative method for synthetic rutile production in Kahnooj titanium Complex.

Keywords: Synthetic rutile, Ilmenite, Roasting, Magnetic separation, ERMS

Heat and Mass Transfer Analysis in a Closed Cooling Tower

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Abstract

A mathematical model is developed and applied for the performance analysis of closed cooling towers to find the effects of spray water temperature, process water and air thorough the tower. The process of heat and mass transfer is analyzed and the effect of spray water to air mass flow ratio, which is an important parameter in tower performance, is investigated. Finally the optimum value of this parameter for a certain closed tower is calculated. The current method is simpler than CFD solutions with an acceptable accuracy.

Keywords: Closed cooling tower, Heat transfer, Mass transfer, Runge-kutta methods



Feasibility Study of Using Advanced Oxidation Processes for Water and Wastewater Treatment

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Abstract

Organic pollutants produced by commercial and industrial activities, cause health and environment problems. They have been taking into consideration by environmental experts. Meanwhile, advanced oxidation processes have been recognized as an important technique for removal and elimination of these pollutants.

In this study, advanced oxidation processes including ozonation processes, using hydrogen peroxide (H_2O_2), UV radiation, and catalytic ozonation processes were reviewed. These processes are compared by considering their removal efficiency, operational conditions and practical ranges of use and the optimum conditions and limitation of the utilization have been demonstrated.

Keywords: Advanced oxidation processes, Ozone, hydrogen peroxide, UV radiation, Photocatalytic oxidation

Effects of Operating Parameters on the Supercritical Fluid Extraction of Pharmaceutical Plants

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Abstract

In this paper operating parameters that used by various researchers for supercritical fluid extraction of pharmaceutical agents from six various types of pharmaceutical plants were studied. Materials that studied here have many applications in the pharmaceutical, food and cosmetic industries and nowadays we see an increasing demand for replacing of these materials by synthetic materials. In this work, effects of various parameters such as temperatures and pressures of extraction fluid, extraction time, mean particle size of powders and other effective parameters on the yield of extraction and composition of extract were reviewed. And optimum conditions for the best composition of extract and highest yield of extraction were reported.

Keywords: Supercritical fluid extraction, Pharmaceutical plants, Extraction of essential oils and Operating parameters