

Review on Downhole Oil-Water Separation Technology

M. H. Sarikhani¹, F. Ameli^{2*}

1- M.Sc. in Petroleum Engineering, Iran University of Science and Technology

2- Assistant Professor of Petroleum Engineering, Iran University of Science and Technology

Email: ameli@iust.ac.ir

Abstract

Down-hole separation technology emerged in the 1990s through which a stream of gas and oil is produced at surface, while a stream of water is injected into the bottom formations and is never transported to the surface, and if needed, it is produced, separately. These systems are known as downhole oil-water and gas-water separation technologies. Hydro cyclones are one of the main components of this separation system. In this study, a comprehensive study has been presented on downhole separation technologies as well as the benefits, requirements and limitations of this technology. This study also provides useful data for the researchers on a number of fields and operational areas and companies owning this technology. According to the results of the present study, successful installations of DOWS system is technically and economically feasible while all the required parameters are accurately evaluated, leading to reducing the costs of water control, production and treatment, and limited surface facilities which is suitable for offshore fields. In addition, application of DOWS system is difficult for separating heavy oil because of the high density difference between water and oil. The water oil ratio should be high so that the dominant phase is water. Manufacturers of hydrocyclone separators recommend water fraction of more than 75%.

Keywords: Downhole Separation, Oil-Water Separators, Hydrocyclones.



A Review of Composting Process: Challenges and Perspectives

M. Ghasemizadeh¹, F. S. Halek^{2*}, M. Dehghan³

1- M.Sc. Student of Renewable Energy Engineering, Materials and Energy Research Center

2- Associate Professor of Environmental Engineering, Materials and Energy Research Center

3- Assistant Professor of Mechanical Engineering, Materials and Energy Research Center

Email: f-halek@merc.ac.ir

Abstract

In recent years, the composting process has become an environmentally friendly process and a sustainable alternative to managing and recycling organic wastes. The purpose of this process is to achieve an organic product called "compost", which is used as an organic fertilizer and amendment in agricultural applications. Compost has many environmental, economic and agricultural benefits, the most prominent of which are discussed in this study. Factors affecting the process, including temperature, carbon to nitrogen ratio, moisture content, aeration rate and pH have been reviewed in detail. Strategies for improving process performance are also reviewed. Odor emission and the relatively high amount of time required to achieve quality product are among the challenges of this process, and the proposed approaches to encounter and address these challenges are reviewed in this paper. Finally, the standardization of the produced compost is explained.

Keywords: Waste Processing, Compost, Process Improvement, Organic Raw Materials; Standardization.

Investigation and Evaluation of Ozonation Performance with Activated Carbon in Removal of Cefixime from Aqueous Environments

S. S. Oskoue¹, D. Kahforoushan^{2*}, N. Jodyree³, M. Mohammadi⁴

1- M. Sc. in Chemical Engineering, Sahand University of Technology

2- Associate Professor of Chemical Engineering, Sahand University of Technology

3- Associate Professor of Chemical Engineering, Sahand University of Technology

4- M.Sc. in Energy Systems Engineering, Sahand University of Technology

Email: kahforoushan@sut.ac.ir

Abstract

In this paper, the ozonation and ozonation with activated carbon methods to remove cefixime medicinal material from aquatic environments have been studied. The results showed that ozonation has had a positive impact on removal of cefixime from aquatic solution, so that the concentration of medicinal contaminant has decreased from 55 ppm to 6 ppm in 30 minutes. Moreover, the COD parameter was reduced by 51%. According to the obtained values, the effect of activated carbon on a certain concentration of medicinal contaminant has been confirmed. Also, the effect of different operational parameters such as concentration of contaminant, concentration of activated carbon, concentration of inlet ozone, reaction time and pH on the process of ozonation with activated carbon was investigated. The maximum removal efficiency of cefixime from aquatic environments was obtained as 96%. This number was obtained at the pH level of aquatic solution which was about 4.

Keywords: Ozonation, Ozonation and Activated Carbon, Cefixime.



Cobalt Compounds Nanoparticles Synthesized by Solution Combustion Method & Characterization

M. Dallal Barati¹, B. Khoshandam^{2*}

1- M.Sc. in Chemical Engineering, Semnan University

2- Associate Professor of Chemical Engineering, Semnan University

Email: bkhoshandam@semnan.ac.ir

Abstract

The purpose of the present work is to synthesize and characterize of the cobalt oxide compounds nanoparticles by using the solution combustion method. For this purpose, a reactor was designed and fabricated. The features of the reactor are its simplicity and efficiency that allows carrying of combustion reactions in a laboratory small scale. Cobalt(II) nitrate hexahydrate was used as oxidant and glycine as fuel. Synthesis was performed for one hour at 200 °C with the presence of glycine in stoichiometric ratio as the reducing agent. The product was characterized by the X-ray diffraction and field emission scanning electron microscopy analysis. XRD analysis confirmed the successful synthesis of the cobalt compounds nanoparticles. The average size of the crystals formed was calculated to be 50 nm by using the Scherrer equation. FE-SEM analysis revealed the good porous structure of the material. The average size of the particles by this method was estimated to be below 60 nm. Therefore, the importance of the present work is in preparing these nanoparticles by a very cost-effective method.

Keywords: Solution Combustion Method, Cobalt Oxide Compounds, Nanoparticles.

Experimental Investigation and Optimization of the Performance of an Electrostatic Precipitator

M. Rokni¹, M. Hojjat^{2*}, M. R. Talaie^{3,4}, S. F. Aghamiri³

1- M.Sc. in Chemical Engineering, University of Isfahan

2- Assistant Professor of Chemical Engineering, University of Isfahan

3- Professor of Chemical Engineering, University of Isfahan

4- Professor of Chemical Engineering, University of Shiraz

Email: m.hojjat@eng.ui.ac.ir

Abstract

In the present, study the performance of a single-stage cylindrical electrostatic precipitator for separation of gypsum and salt particles in the air was experimentally investigated. The average diameter of salt and gypsum particles are 198 and 290 nm, respectively. The effect of structural properties, i.e., particle size and specific electrical resistance and operating conditions, i.e., voltage, the diameter of discharge electrode, air velocity, and electric current on the collection efficiency were investigated. Results show that the collection efficiency for gypsum particles is more than that of the salt particles. In the voltage range of 6 to 10 kV, sparks didn't occur so, by increasing the voltage obtaining higher values of efficiency is possible. The decrease in efficiency by an increase in air velocity for gypsum particles is higher than that of salt particles, which show that for salt particles operation at higher flow rates is economically possible. Optimum collection efficiencies of gypsum particles at gas velocities of 1.2 and 2 m/s were determined by response surface method to be 88.6% and 60%, respectively. Corresponding values for salt particles are 72.8% and 68%, respectively. experimental results verified these values.

Keywords: Electrostatic Precipitator, Corona Discharge, Optimization, Particles Separation.



Investigating the Combustion Performance and Emission of Biodiesel Pollutants Produced from Three New Non-Edible Oils in a Diesel Engine

F. Jafarihaghighi¹, H. Bahrami², M. Ardjmand^{3*}, B. Jafari Haghighi⁴

1- M.Sc. in Chemical Engineering, Department of Chemical Engineering, South Tehran Branch, Islamic Azad University, Tehran, Iran

2- M.Sc. in Mechatronics, Department of Mechanical Engineering, Arak Branch, Arak National University, Arak, Iran

3- Associate Professor of Chemical Engineering, Department of Chemical Engineering, South Tehran Branch, Islamic Azad University, Tehran, Iran

4- Assistant Professor of Plant Physiology, Department of Agriculture and Natural Resources, Arsanjan Branch, Islamic Azad University, Arsanjan, Iran

Email: m_arjmand@azad.ac.ir

Abstract

The emissions of three new species of biodiesel (Common sage, Rosmarinus officinalis and Mentha oil) and their combustion performance in a diesel engine were investigated. The results show that by increasing the ratio of biodiesel mixed with diesel fuel, the amount of torque decreases with increasing engine speed, and the closest results to diesel fuel are related to common sage biodiesel. common sage biodiesel showed that the power produced is 1 to 2% higher than other biodiesels. The highest specific brake fuel consumption was observed in mint biodiesel. The outgoing gas temperature for common sage is between 1 and 3% lower than the other two types of biodiesel. All biodiesels reduced nitrogen oxides, carbon monoxide, and sulfur dioxide. The highest rate of reduction in soot turbidity was 85%, in the case of common sage biodiesel.

Keywords: Mentha Biodiesel, Rosmarinus Officinalis Biodiesel, Common Sage Biodiesel, Exhaust Emissions, Engine Performance.