

## The Effect of Boiling SiO<sub>2</sub>-Water Nanofluid on Characterization of Boiling and Roughness of Surface in Different Regions of Boiling

F. Rostamian<sup>1</sup>, N. Etesami<sup>2\*</sup>, M. Nasr Esfahany<sup>3</sup>

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

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

3- Professor of Chemical Engineering, Isfahan University of Technology

Email: netesami@cc.iut.ac.ir

### Abstract

In present study, boiling of water-silica nanofluid on circular flat plate heater was done. For observing the effect of concentration on critical heat flux and boiling heat transfer coefficients, three concentration 0.005, 0.007 and 0.01 vol.% was prepared. The critical heat flux enhancement was 52, 67 and 87%, and the boiling heat transfer coefficients enhancement was 114, 142, 74%, respectively. For investigation roughness of surface, deionized water was boiled for several times in surface that coated with nanofluid in two regions of boiling, nuclear boiling region and Critical heat flux region and was observed that the roughness of surface was constant in consecutive boiling. Boiling of deionized water on coated surface in two regions was indicated that critical heat flux and boiling heat transfer coefficients was enhanced.

**Keywords:** Pool Boiling, Nanofluid, Regions of Boiling, Critical Heat Flux, Nuclear Boiling, Boiling Heat Transfer Coefficients, Roughness of Surface.



## Study of the Effects of Ozonation on Water Organic Matter Removal: A Case Study on a Water Treatment Plant

B. Medi<sup>1\*</sup>, A. R. Bahramian<sup>2</sup>, S. Dehestaniathar<sup>3</sup>

1- Assistant Professor of Chemical Engineering, Hamedan University of Technology

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

3- Assistant Professor of Environmental Health Engineering, Kurdistan University of Medical Sciences

Email: medi@hut.ac.ir

### Abstract

In this work, the effects of ozonation stage on natural organic matter (in particular total organic carbon (TOC)) removal, were investigated for one year operation of Hamedan Shahid Beheshti water treatment plant. Ozonation which is the first disinfection stage in this plant plays a significant role in removing organic carbon from the water such that roughly 60 % of it is converted into volatile compounds, which are directly stripped from the water. Analysis of carbon contents, residual ozone, and operating parameters such as water flow rate, pH, and alkalinity indicated that the ability of this stage at removing organic carbon is even more than that of the flocculator (pulsator) stage. Overall, it was identified that the organic carbon removal is very well within the range specified by the standards.

**Keywords:** Water Treatment, Ozonation, Total Organic Carbon, Disinfection, Carbon Removal.

## Utilizing Biological Methods for Treatment of Tannery Effluents

Y. Abdollahi<sup>1</sup>, M. Zandieh<sup>2</sup>, S. Yaghmaei<sup>3\*</sup>

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

2- M. Sc. in Chemical Engineering, Sharif University of Technology

3- Professor of Chemical Engineering, Sharif University of Technology

Email: yaghmaei@sharif.edu

### Abstract

Tannery effluent contains large amounts of carbon, nitrogen, heavy metals such as chromium and highly toxic chemicals. Therefore, releasing this untreated effluent into the environment can cause lots of harmful consequences. Although many treatment techniques are being utilized, biological methods are gaining importance, since these methods are more cost-effective and eco-friendly than the others. In biological methods, in addition to some plants, microorganisms are utilized for removal of heavy metals pollution and reduction of TDS, COD and BOD parameters. A lot of different bacterial, fungal, cyanobacterial and microalgal species are utilizing for bioremediation. In this review, some of these microorganisms and their ability to bioremediation of tannery effluent have been discussed. This review shows that biological methods can be relevant alternative to chemical approaches for treatment of tannery effluents.

**Keywords:** Tannery Effluent, Biological Treatment, Chromium, Microorganism.



## Introducing Nanocrystals as a New Technology in the Production of Functional Beverages and Food Products

S. Ghasemi<sup>1</sup>, S. M. Jafari<sup>2\*</sup>

1- M. Sc. of Food Science and Technology, Gorgan University of

Agricultural Sciences and Natural Resources

2- Associate Professor, Gorgan University of Agricultural Sciences and Natural Resources

Email: Smjafari@gau.ac.ir

### Abstract

One of the most successful technologies for controlled drugs delivery in the pharmaceutical industry, is nanocrystals technology that recently this technology has been used in the food industry. Nanocrystals are materials that have at least one dimension smaller than 100 nanometers and consist of one or more crystalline arrangement of atoms in attending, or nanoparticles are crystalline in nature. Nanocrystals can be used in two way to carry active ingredients used: 1. Nanocrystals themselves are as carriers of active ingredient 2. Bioactive Nanocrystals due to environmental conditions or processing, such as pH, oxygen, light and temperature to decompose, can be covered with a protective polymer layer and transfer the active ingredient. In the first case such as nanocrystalline cellulose, chitin and starch by linking with the active ingredient act as a carrier. Various methods are used for the preparation of these nanocrystals, such as acid hydrolysis, enzymatic hydrolysis, nanosedimentation and mechanical methods such as high pressure homogenization and Pearl milling. In the second one Polymers such as hydrocolloids, poly-methacrylate and poly-lactide can be used as cover. As a result of using nanocrystals technology in the pharmaceutical industry, it can be applied to functional products such as functional drinks, food items, the target market will be the future of this technology.

**Keywords:** Encapsulation, Nanocrystal, Nano Sedimentation, Functional Product.

## Modeling and Investigating Biological Factors Affecting on the Biotransformation of Castor Oil in to Conjugated Linoleic Acid Using Lactobacillus Strains

Z. Kouchak Yazdi<sup>1</sup>, I. Alemzadeh<sup>2\*</sup>, H. Sadat Touri Karami<sup>3</sup>

1- Ph. D. Student of Chemical Engineering, Sharif University of Technology

2- Professor of Chemical Engineering, Sharif University of Technology

3- M. Sc. of Chemical Engineering, Sharif University of Technology

Email: Alemzadeh@sharif.edu

### Abstract

Conjugated linoleic acid CLA, including fatty acids with useful biological properties, such as boosts the body immune system and can be used to produce functional food products. Therefore, biotransformation of castor oil in to Conjugated linoleic acid using lactobacillus strains was investigated. Among the investigated bacteria, Lactobacillus plantarum PTCC1058 and after that PTCC1745 have the greatest ability for CLA production. The highest yields were obtained by using Renco lipase enzyme and Tween 80 as a detergent. CLA yield was decreased by adding glucose, fructose and sucrose in the medium. This reduction was greater for sucrose. Maximum CLA yield (37.11%) for Lactobacillus plantarum PTCC1058 were achieved in the 4.6 mg / ml oil concentration, 15% w/v washed cells and 121 h reaction time. The highest CLA concentration (2177.6 mg/l) was produced in 10 mg/ml oil concentration, 15% w/v washed cells and 173.92 h reaction time.

**Keywords:** Conjugated Linoleic Acid, Modeling, Biotransformation, Castor Oil.



## Optimization of Water Flooding, Gas Injection, and WAG Flooding Using Simulated Annealing Algorithm

H. Ruzsaz<sup>1</sup>, S. Sadeghnejad<sup>2\*</sup>, M. Manteghian<sup>3</sup>

1- Msc. of Petroleum Engineering, Tarbiat Modares University

2- Assistant Professor of Petroleum Engineering, Tarbiat Modares University

3- Professor of Chemical Engineering, Tarbiat Modares University

Email: sadeghnejad@modares.ac.ir

### Abstract

The water alternating gas injection (WAG) method is a powerful technique that is capable of production of unrecoverable oil. The main purpose of WAG is to improve gas sweep efficiency by injecting water slugs. Reservoir rock, fluid properties, formation heterogeneity, injection method, and its subsequent parameters (e.g., WAG ratio, size of injected slug, rate of injection, injection duration) can affect the flooding recovery. The main purpose of this study is to implement a simulation-optimization algorithm to optimize water flooding, gas injection and WAG flooding. For this purpose, an Iranian offshore formation is used as a case study. Subsequent to a natural production period, different scenarios are considered. In all scenarios, the available operational parameters are considered as an optimization parameters; while, the recovery of the field is considered as an objective function. Optimization of each parameter results in finding the highest ultimate oil recovery for each scenario.

**Keywords:** Reservoir, Recovery Enhancement, Water Alternating Gas Injection, Optimization, Simulation, Simulated Annealing.

## Study on the Plasma Gasification Technology for Converting Waste to Energy

M. Fatehifar<sup>1</sup>, J. Shayegan<sup>2\*</sup>

1- B. Sc. of Chemical Engineering, Sharif University of Technology

2- Professor of Chemical Engineering, Sharif University of Technology

Email: shayegan@sharif.edu

### Abstract

*Solid waste is one of the world's important issues. Common methods for processing solid waste are landfill, incineration, anaerobic digestion, and pyrolysis. All these methods have some disadvantages and weaknesses. So, finding a new technology which is more powerful and reliable is necessary. The newest method is plasma gasification, which was done on a pilot scale for the first time in 1998. The temperatures up to 5000°C is achievable because of the existence of free electrodes inside the plasma arc. These temperatures are able to turn almost everything into syngas at oxygen starve environment. This process has 4 stages: waste pretreatment, plasma gasifier, gas cleaning system, energy recovery system which are described. Syngas is mostly made of H<sub>2</sub>, CO, CO<sub>2</sub>. Using two-stage plasma gasification technique, amplification of throughput, and syngas quality are achieved. This technology requires a considerable amount of initial investment, though it is known to be highly profitable economically.*

**Keywords:** Waste, Plasma, Gasification, Energy, Recycle, Reactor, Yield.



## Shale Oil: The Extraction Technologies, Refinements and Limitations

R. Babanezhad<sup>1</sup>, L. Vafajoo<sup>2\*</sup>

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

2- Associate Professor of Chemical Engineering, Chemical and Polymer Engineering Department, Islamic Azad University, Tehran South Branch, Tehran, Iran

Email: vafajoo@azad.ac.ir

### Abstract

*Limitation of conventional fossil fuels has led to paying more attention towards the shale's oil and gas resources. These resources will economically be justified when the crude oil price passed the 60 dollars per barrel mark. In the present study, the potential of the shale oil in the world; the capacity of each region, the leading countries using this type of oil extraction and their refining methods undertaken. Moreover; limitations and advantages of each method regarding their environmental impacts were investigated. Ultimately; the importance of this unconventional fossil fuel in today's technological world was determined.*

**Keywords:** Shale Oil, Krogen, Sources of Shale Oil, Extraction, Technologies, Limitations, Facilities.

# Parameter Optimization for Vanadium-EDTA Complex Removal Using Activated Carbon

M. Poorbaba<sup>1</sup>, M. Soleimani<sup>2\*</sup>

1- M. Sc. Student of Chemical Engineering, Amirkabir University of Technology

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

Email: soleimanim@aut.ac.ir

## Abstract

One of the methods for separation of Vanadium from secondary resources which contains it, is extraction with aqueous solution of ethylene di amine tetra acetic acid (EDTA). In this paper, removal of Vanadium from aqueous phase with adsorption method has been investigated. Because of the high ability of activated carbon in adsorption of organic compounds, a commercial activated carbon was used for adsorption of Vanadium-EDTA complex. The effects of main parameters such as initial concentration of Vanadium ( $C_{i,v}$ ), molar ratio of EDTA to Vanadium ( $L/M$ ), temperature ( $T$ ) and initial pH of solution ( $pH_i$ ) was studied on capacity of the adsorbent. For optimization of selected parameters and having a proper model to describe behavior of the system, RSM method was used. Based on experimental results, in optimized conditions:  $C_{i,v}= 200$  ppm,  $L/M=2$ ,  $T=30$  °C and  $pH_i= 2$  the maximum value of adsorption obtained 14.7 mg/g.

**Keywords:** Optimization, Adsorption, Activated Carbon, Vanadium, Ethylene Di Amine Tetra Acetic Acid.