Solid-Liquid Equilibrium in Mixtures of Pyrene and Long Chain Normal-Alkanes with Optimization of Larsen Equation Parameters

H. Rezaei[1], A. A. Dadkhah[2*], M. A. Bahmani[1], E. Frydouni[1]
1- M. Sc. Student of Chemical Engineering, Isfahan Univeristy of Technology
2- Assistant Professor of Chemical Engineering, Isfahan University of Technology
Email: dadkhah@cc.iut.ac.ir

Abstract

Thermodynamic properties of mixtures of polycyclic aromatic hydrocarbons and long chain normal-alkanes are important for understanding phase transformations of heavy petroleum fractions. In this study, a new method for optimization of parameters of modified UNIFAC model as proposed by Larsen was suggested and validated by comparing the calculated solubility and activity coefficients of a polycyclic aromatic hydrocarbons (pyrene) in long chain normal-alkanes(n-$C_{18}H_{38}$, n-$C_{28}H_{58}$, n-$C_{30}H_{62}$, n-$C_{36}H_{74}$, n-$C_{50}H_{102}$) with experimental data. Good agreement was observed between experimental data and model in diagrams of solid-liquid equilibrium temperature and activity coefficient of pyrene versus solubility of pyrene in long chain normal Alkanes. These results also were compared with another set of calculated results in literature and they were comparable or superior to the published results. Larsen model parameters were calculated by using values as reported by Larsen as initial guess. Then these values were optimized by a nonlinear optimization code for minimizing the error.

Keywords: Solid-Liquid Equilibrium, Pyrene, Long Chain Normal-Alkanes, Modified UNIFAC Model

❐❐❐❐

Photocatalitic Application of Graphene

S. A. Hosseini[1*], S. Nouri[2], Sh. Babaei[3]
1- Assistant Professor of Applied Chemistry, Urmia University
2- Professor of Applied Chemistry, Urmia University
3- M. Sc. in Applied Chemistry, Urmia University
Email: s_ali_hosseini@yahoo.com

Abstract

Graphene, an allotrope of carbon, is a single carbon atomic layer of graphite that has specific electrical and optical properties, high conductivity and a large specific surface area. Thus, it has been regarded as an important component for making various composite materials. Especially, graphene-based semiconductor photocatalysts have attracted extensive attention because of their potential for solving environmental and energy problems. Graphene-based photocatalysts mainly show significant photocatalytic applications in four fields: Photocatalytic decomposition of organic pollutants, Photocatalytic splitting of H_2O to produce hydrogen, Photocatalytic reduction of CO_2 and Photocatalytic disinfection.

Keywords: Graphene, Graphene Oxide, Photocatalyst, Semiconductor

Extraction Unit Design of a Natural Sweetener from Stevia

P. Nahid[1*], I. Alemzadeh[2], S. S. Mortazavi[3]
1- Instructor of Chemical Engineering, Sharif University of Technology
2- Professor of Chemical Engineering, Sharif University of Technology
3- B. S. in Chemical Engineering, Sharif University of Technology
Email: nahid@sharif.edu

Abstract

Stevia or sweet plant is a native plant in the continent of America. It was studied by a Spanish physician for the first time in 1888. The people of brazil and Paraguay were used it as a sweetener and as a medicine for high blood pressure, gastro burn, uric acid control, and fatness since centuries ago. At present many countries such as Japan have marketed stevia extract as a replacement for unnatural sweeteners such as saccharine, aspartame and cyclamate to avoid their hazardous effects. The sweetening compounds (glycosides) are stevioside, rebaudioside A, etc. in this project different methods of stevia glycoside production were investigated such as solvent and super critical fluid extractions, nano, ultra and membrane filtrations. Finally a suitable schedule was designed to produce stevia sweetener.

Keywords: Stevia, Extractions, Membrane, Nano, Ultra Filtrations

❐❐❐❐

Recycling Methods for PET Waste Bottles

Y. **Sefidbakht[1], A. H. Haghighi[2*], M. Ghorbani[3]**
1- Assistance Professor of Biophysics, ShahidBeheshti University
2- Instructor of Polymer Engineering, Polymer Engineering Faculty, Department of Engineering, Shiraz Branch, Islamic Azad University, Shiraz, Iran
3- Ph. D. Student of Organic Chemistry, MalekAshtar University of Technology
Email: haghighi@iaushiraz.ac.ir

Abstract

Plastics consumption in different industries has been expanded and plastics are well make up 10% of solid wastes. Plastic wastes cause various environmental problems because they are non-degradable. Therefore, recycling of these plastics not only protect the ecosystem but also has brings economic advantages. Due to its impermeability and chemical resistance, Poly ethylene terephthalate possess a high consumption rate mostly in preparation of water bottles. Hence, recycling of these bottles becomesessential. Poly ethylene terephthalate wastes bottles recycling methods are; pre-consumer industrial scrap, mechanical and chemical recycling which are surveyed in this paper. Chemical recycling include different methods such as,methanolysis, glycolysis, hydrolysis, ammonolysis, aminolysis and others. Among them, the glycolysis method attracted much more attention in industry regarding lower costs, and also providing diverse products.Also environmental friendly biotechnological methods based on enzyme catalysis are become in attention nowadays under promising investigations, and hopefully could be applicable in industrial scale along with mentioned approaches.

Keywords: Waste Bottles, Poly (Ethylene Terephthalate), Mechanical Recycling, Chemical Recycling, Biotechnology

Review of Synthesis Methods and Characterization of Porous Titanium Oxide Nanoparticles

M. Zakaryapoor[1], S. Hajizadeh[2], S. Khodaparast[3], M. Shamsi[2], S. Khadempir[4], I. Frahbakhsh [5*]

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

2- B. S. in Chemical Engineering, Quchan Universtiy of Advanced Technology

3- M. Sc. Student of Chemical Engineering, Nooshirvani University of Technology

4- Assistant Professor of Chemical Engineering, Quchan University of Advanced Technology

5- Assistant Professor of MeChanical Engineering, Islamic Azad University, Quchan Branch

Email: ifarahbakhsh@gmail.com

Abstract

Titanium dioxide is used in many different fields, from industry to the area allocated to health and use of this materials to progress. Hence, reviewed synthesis and properties of porous titanium dioxide nanoparticles as a new and growing field is examined. Porous structure of titanium dioxide synthesized different methods for example, sol-gel and precipitation method. Also, The characterization of this type of nano-structures have been investigated.

Keywords: **Sol-Gel, Porous Titanium Dioxide Nanoparticles, Nano-Porous Particles, Mesoporous Particles, Micro-Porous Particles, Porous macro Particles**

❐❐❐❐

Investigation the Effect of Micro and Nano Catalysts on Burning Rate of Nitramine Composite Solid Propellant

S. M. R. Niazi[1], S. A. Vaziri[2*], M. A. Dehnavi[3]

1- M. Sc. in Solid Propellants, Imam Hossein Comprehensive University

2- Assistant Professor of Chemical Engineering, Imam Comprehensive University

3- Associate Professor of Chemical Engineering, Imam Comprehensive University

Emial: vaz_in@yahoo.com

Abstract

Adding Nitramine compounds such as RDX and HMX to the composite solid propellants, despite their many advantages, causes low burning rate and high pressure index (n). Therefore, determined of the catalyst burning rate to improve the burning rate of composite solid propellant containing Nitramine is necessary. In this paper, effect of Micro and Nano-catalysts on the composite solid propellant based on HTPB / AP / Al / RDX investigated and the catalysts of burning rate for this type of propellant was determined. According to the study, Nano-catalysts than to Micro-catalysts has a more effect on increase the burning rate of this type of propellant and also with smaller percentage of Nano-catalyst can be obtained higher burning rate.

Keywords: **Burning Rate Catalysts, Ballisti Modifiers, Composite Solid Propellants, Nitramine**

Removal of Malachite Green Dye from Aqueous Solution Using MnO_2 Nanocomposite in a Fixed Bed Column System

R. Ansari[1*], N. Mahmoodi[2] , F. Ostovar[3]
1- Professor of Chemistry, University of Guilan
2- M. Sc. of Chemistry, University of Guilan
3- Ph. D. Student of Chemistry, Enviromental Research Institute,
Acadmic Center for Culture & research of Rasht
Email: ransari271@guilan.ac.ir

Abstract

In this research, removal of cationic dye Malachite green dye (MG) was carried out using manganese dioxide sawdust nanocomposite (MnO_2/SD NC) in a fixed bed column system. In order to find out the optimum adsorption conditions, the effect of important empirical parameters such as initial feed pH, initial concentration, bed depth and influent flow rate onto sorption capacities of the introduced adsorbent was investigated. The performance of MnO_2/SD NC in fixed bed column system was evaluated using Adams-Bohart and Thomas kinetics models. The results of Thomas kinetic model showed that the system has maximum capacity 92/0 mg/g. Desorption investigation showed that the used column can be regenerated with high performance for reuse.

Keywords: MnO_2 Nanocomposite, Fixed Bed Column, Malachite Green, Adsorption

❐❐❐❐

A Review on Preparation and Performance of Resistant Membranes for Application in Organic Solvent Nanofiltration

M. Namvar-Mahboub
Assistant Professor of Chemical Engineering, University of Gonabad
Email: namvarmahboob@yahoo.com

Abstract

Over the past two decades, organic solvent nanofiltration (OSN) has been considered by a lot of researchers. This kind of membrane process can be a good candidate to replace thermal separation processes due to its advantages including; low energy consumption and reduction of solvent waste. Despite of these advantages, in the field of organic solvent separation, researches are limited to the laboratory and pilot scales and at industrial scale have not been developed except for few cases. Indeed, reluctance of industries to implement new technologies, hardness of large scale module construction for ceramic membranes and low stability of polymeric membranes are the most important parameters which prevent expansion of this process. This work review all kind of prepared polymeric, inorganic and mixed matrix membranes and their modification procedure for organic solvent nanofiltration. Additionally, the performance and chemical stability of prepared membranes has been investigated through solvent separation process.

Keywords: Organic Solvent Nanofiltration, Polymeric Membranes, Nanocomposite Membranes, Chemical Stabili

Experimental Modeling of 4-Chloro-2-Nitrophenol Adsorption Onto Kaolin Using Response Surface Methodology

A. Mehrizad[1*], P. Gharbani[2]

1- Assistant Professor of Physical Chemistry, Department of Chemistry,Tabriz Branch, Islamic Azad University, Tabriz, Iran

2- Assistant Professor of Applied Chemistry, Department of Chemistry, Ahar Branch, Islamic Azad University, Ahar, Iran

Email: mehrizad@iaut.ac.ir

Abstract

This research was studied the efficiency of kaolin and modified kaolin with cetyltrimethylammonium bromide and tetrabutilammonium iodide surfactants as adsorbents in the adsorption of 4-chloro-2-nitro phenol. Batch adsorption studies were carried out to study the effect of important parameters using response surface methodology (RSM). Results showed that the modification of kaolin with cetyltrimethylammonium bromide was enhanced the removal efficiency (>50%). As results, increasing of adsorbents amount in acidic media due to increase of 4-chloro-2-nitro phenol removal. Evaluation of the interplay of variables showed that interaction between initial concentration-pH and adsorbent amount-pH have the most influence on the adsorption onto kaolin, and also interaction between adsorbent amount-contact time and adsorbent amount-pH have the most influence on the adsorption of 4-chloro-2-nitro phenol onto modified kaolin with cetyltrimethylammonium bromide and tetrabutilammonium iodide, respectively.

Keywords: Adsorption, 4-Chloro-2-Nitro Phenol, Kaolin, Design of Experiments