Oxidative Desulfurization of H_2O by Molybdenum@Nickel Nanoparticles

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Abstract
Sulfur content of under ground waters and waste waters from the refinerys should be reduced significantly before consumption. One remarkable process is Oxidative DeSulfurization. Sulfur compounds of the water transform to sulfones and then get out of solution as a steam. In this work, core-shell Nickel-Molybden nanoparticles with sizes ranging from 55 to 100 nm were synthesized using successive reduction method and then, were deposited on γ-alumina support using wet impregnation method. This catalyst was characterized by UV-vis, SEM, EDS, TEM and XRD analysis. ODS of water was conducted using the catalyst along with Hydrogen Peroxide as oxidant. 91.2% of sulfur content ,was removed from the water after 4 h of reaction at 60°C. The order of mentioned reaction was changeable between 1.01 and 1.27 , the rate constant changeable between 0.021 and 0.05 min^{-1} on different temperatures.Catalyst's ability at 60°C got reduced about 30%, after two times of washing.

Keywords: Oxidative Desulfurization, Sulfur, Core-Shell, Nickel, Molybdenum, Water, NanoParticle.

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The Role of Different Adsorbents in the Removal of Sulfur Compounds from Gas or Liquid Fuels

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Abstract
Demand for gas or liquid fuels has increased in recent decades, while environmental legislation strict to reduce environmental pollutants (especially sulfur compounds) from fuels. There are various methods to diminish sulfur compounds from gas or liquid fuels that adsorption method on solid sorbents has attracted the attention of many researchers because it is efficient, inexpensive and high-efficiency method. Articles studying and results of laboratory have shown that metal- organic framework structures due to unique properties such as high porosity and multiple pores, high surface area, higher adsorption, low energy compared to other adsorbents such as silica gel, zeolites, carbon and metal structures have shown higher performance in removing sulfur compounds from gas or liquid fuels. However, precise determination of their performance relative to other adsorbents depends on the operating conditions and the type of adsorbate. In spite of the differences in the experimental conditions, the sulfur capacities MOFs or their hybrids were significantly higher (0.1 gS/g) the other adsorbents (0.01gS/g) (more than 10 times). Although it should be noted that due to the differences of experimental condition, this comparison needs to be taken cautiously. These structures maintain their performance and stability after several adsorption-desorption cycles and have shown good results for sulfur removal. For this reason, these structures have been widely used as adsorbents for the removal of sulfur compounds from the gas or liquid phase, catalysts, sensors and etc.

Keywords: Sulfur Compound, Adsorbents, H_2S, Mercaptan.

Organic Nanoreinforcements Utilized for Preparation of Nanocomposite Packaging Materials

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Abstract

A new approach to improve the properties of plastics is the using of fillers. Nanoreinforcements are a class of fillers that have a dimension below 100 nm and lead to produce nanocomposites. The nanoreinforcements used in the fabrication of nanocomposites are divided to organic and inorganic materials. Cellulose nanocrystal, chitin and chitosan nanofibers and also starch nanoparticles are examples of organic nanomaterials. In this review paper, the structure and characteristics of organic nanofillers have been investigated. Moreover, their improving effect on the functional properties of polymers and biopolymers has been studied. Also, in the recent years the application of these nanomaterials has new insights such as enzyme immobilization and fabrication of nanohybrids. The new applications of organic nanomaterials that determine the future of research in this area, has been investigated in this paper.

Keywords: Nanoreinforcement, Organic Materials, Nanocomposite Packaging, Chemical Structure, Functional Properties.

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Investigation and Evaluation of Application of Ozonation Process in Removal of Carbendazim Pesticide Residues from the Aquatic Environments

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Abstract

In this paper, ozonation method is used to remove carbendazim from aquatic environment. In this method, the produced ozone gas passes through an injector and then is converted into little bubbles and finally is injected into the synthetic wastewater. Spectrophotometer was used to measure carbendazim concentration. The complete factorial method was used to design the experiment. This design is considered to be repeated for two times for time parameters at five different levels of 5, 10, 15, 30 and 45 per minute, pH levels of 5, 6.73 and 9, and initial concentration of carbendazim levels of 2, 6, and 10 mg/l. The results showed that the maximum removal efficiency of carbendazim was 91% for a period of 15 minutes, pH level of 9 and concentration of 10 ppm and the most effective parameters on carbendazim removal efficiency have been initial carbendazim concentration, initial wastewater pH and ozonation time, respectively.

Keywords: Chemical Pesticides, Ozonation, Carbendazim, Spectrophotometer, Pollution.

Pyrolysis of Scrap Tire Powder and Identification of the Resulting Liquid Fuel

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Abstract

With the strong global increase in transportation technology and daily increase of cars, the interest in recycling of waste tires have been increased due to energy resources and environmental protection. One of the recycling methods for waste tires is pyrolysis and converting them into liquid fuels. In this study the effect of final reaction temperature and residence time on pyrolysis process and obtained liquid fuels were investigated. Among the pyrolysis products which are solids, liquids and gases, the liquids were selected for further investigation. These pyrolysis liquids were characterized by FTIR spectroscopy, and the results showed that liquids contain linear hydrocarbon more than 4 carbon moves toward aromatic component with increasing pyrolysis temperature. These findings were also confirmed by Detailed Hydrocarbon Analysis(DHA). The components of pyrolysis liquids consisted mainly of 2,3-dimethylbutene, 2-Methylbutene, t-Isobutyl-4-ethyl-benzene, and 1-m-4-Isopropyl-benzene. The results also showed that the percentages of gases and liquids were increased and decreased respectively with increasing of temperature but there is no change in char percentage yields above 500°C. It is Obviouse that the maximum amount of solids is equal to the percentage of carbon black and other minerals in the rubber formulation that remain in pyrolysis. Measuring of calorific value of pyrolysis liquids showed good compatibility with commercial heating fuels.

Keywords: Pyrolysis, Waste Tire, Identification, Liquid Fuels, Colorific Value.

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Modeling Synechococcus Sp. Growth Under Different Light Regimes

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Abstract

A cyanobacterium specie, Synechococcus sp. was cultured in a photobioreactor equipped with internal illumination system. Different light irradiances were implemented with internal illumination to the photobioreactor and the cell culture was measured during growth period. With increase of light irradiance before photoinhibition, growth of cells along with maximum optical density, maximum growth rate and biomass productivity have increased. The photoinhibition was occurred at higher light irradiance of 250 $\mu E\ m^{-2}s^{-1}$ that caused decrease in cells growth, their optical density and biomass production. Maximum optical density of 5.91 was reached in an 80-day period of growth without photoinhibition. With a modified Monod function, experimental data was successfully modeled.

Keywords: Synechococcus Sp., Light Irradiance, Growth Modeling, Photobioreactor, Monod Function.