Review On Hydrogen Production From Syngas In Biological Water Gas Shift Reaction

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Abstract

Use of hydrogen as clean and renewable fuel would decrease environmental concerns and would be a solution for security and independency of energy that economical methods should be developed for production of it. Currently, most of hydrogen production in the world is on steam reforming of methane, then catalytic water gas reaction. Because of high cost for high temperature operation and for final gas treating, in recent years other methods such as microbial production are interested. Microbial productions besides producing clean fuel have potential for waste reducing. This paper investigates biological water gas shift process with respect to included microorganisms and different reactor designs thoroughly.

Keywords: Biological Water Gas Shift Reaction, Photosynthetic Bacteria, Sysngas, Bioreactor

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Investigation Of Erythromycin Production By *Saccharopolyspora erythraea* In Batch Process, Using Different Soybean Flour Concentration

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Abstract

Erythromycin is a macrolide antibiotic that produced by Saccahropolyspora erythraea in a multisteps fermentation process. There are several factors affecting the process, including media components. Media have an important role in growth rate of the strain, productivity, time and cost of the process. In this study the batch fermentation process for erythromycin production in a various soybean flour-rich media is investigated. Soybean flour is a rich, available and cheap nitrogen source.During the process,amount of produced erythromycin, pH,biomass as well as some of kinetics parameters were measured; also myselial morphology was studied. The amount of produced erythromycin was measured by specterophotometry. The results indicated that the variation in concentration of soybean flour in media could affect on the values of the pH, biomass, erythromycin production and kinetics parameters. The optimized concentration of soybean flour for erythromycin production was 30(g/L).

Keywords: Fermentation Process, Batch System, Erythromycin, Soybean Flour, *Saccharopolyspora erythraea*

Investigation Of Bioconversion Of Normal Chain Alkanes Treated By Native Consortia

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Abstract

The researches on biological conversion of alkanes have mainly focused on their removal using different species. However, in this paper the aim is to investigate the conversion of alkanes using some native consortia in order to understand the function of those microorganisms on cracking of long chain alkanes into lighter ones. For this purpose, the effects of native consortia prepared form petroleum polluted sights on different alkanes including octadecane, nonadecane, dodecane and eicosane are evaluated. The extent of biological conversion is evaluated using GC-MS analytical instrument. The results show that some oxidized compound such alcohols, fatty acids and also branched hydrocarbons are appeared in minor amounts. But, a white powder is remained after biological treatment of alkanes that is insoluble in both water and oil phases. Using FTIR instrument the presence of OH, COOH, C=O bonds, are revealed indicating a polymeric substance that is produced from the intermediated products of bioconversion of alkanes.

Keywords: Normal Alkane, Mixed Cultures, Bioconversion, Normal Chain Hydrocarbon

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Application Of Bioleaching Technology In Detoxification And Recovery Of Valuable Metals From Spent Catalysts

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Abstract

Spent hydroprocessing catalysts are classified as hazardous waste by the US EPA. Several alternative methods such as disposal in landfills, regeneration/rejuvenation and reuse, utilization as raw materials to produce other useful products, and recovery of metals by hydrometallurgy and pyrometallurgy, are available to the refiners to deal with the spent catalyst problem. Hydroprocessing spent catalysts contain appreciable concentrations of metals such as Mo, Co, W, V, Ni and Al, which are used extensively in the steel industry and in the manufacture of special alloys. In the view of the environmental and economic benefits, increasing attention has been paid to develop processes for recovering metals from spent hydroprocessing catalyst. The existing recovery methods are often costly and are associated with negative environmental impact. Bioleaching which is a green technology offers a novel approach for metal recovery from various solids. Bioleaching is based on the ability of microorganisms to transform solid compounds into soluble and extractable elements which can subsequently be recovered. This article is a review on the existing methods for management of spent catalyst and the researches which have been done in the field of bioleaching of spent catalysts.

Keywords: Bioleaching, Metal Recovery, Spent Catalyst, Hydroprocessing

Effects Of Temperature, pH And Glucose Concentration On Bioethanol Production By *Mucor indicus*

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Abstract

Effects of different temperature, pH and glucose concentration were investigated on fermentation by Mucor indicus under aerobic condition in order to optimize the yield of ethanol. Taguchi method in three levels were used for experimental design and showed 95% confidence on the results. The analysis showed that the optimum temperature for higher ethanol production was 30oC for fermentation by the fungus. Glucose concentration (in the range of 25-100 g/L) and pH (in the range of 4.5-5.5) showed less effects on fermentation compared to temperature. Maximum ethanol yield was 0.44 g/g glucose. Glycerol was the most important byproduct of the fermentation. According to the analysis, the optimum glucose concentration for higher glycerol production was 100 g/L. Temperature and pH showed minor effects on glycerol production. Maximum glycerol yield was 89 mg/g glucose.

Keywords: ***Mucor indicus*, pH, Temperature, Glucose Concentration**

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Comparision Study On Bacterial And Fungal Bioremediation Of 2,4,6-Trinitrotoluene Contaminated Water And Soil

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Abstract

In recent years, considerable efforts have been invested in finding economical remediation technologies for man-made chemicals elimination from environment, among which biological treatment processes have attracted the attention of many researchers. Due to the toxic and mutagenic effects of nitroaromatic explosive, these energetic materials are recognized as a major environmental problem. Particularly, 2,4,6-trinitrotoluene, a widely exploited military and industrial explosive, had a great contribution in contamination of water and soil. In this research, for identifying the appropriate organisms among the 7 bacterial and fungal strains reported as effective in aromatic hydrocarbon biodegradation, trinitrotoluene biotransformation was firstly examined in aqueous phase at water solubility of trinitrotoluene (100(mg/l)). Pseudomonas putida, showing complete biotransformation of trinitrotoluene, was selected as a superior organism under aerobic condition. Afterwards, bioremediation of a trinitrotoluene contaminated soil (1000(mg/kg)) in slurry phase was performed using Pseudomonas putida where 97% trinitrotoluene biotransformation was achieved whitin 25 days.

Keywords: **Bioremediation, Trinitrotoluene, Slurry Phase, *Pseudomonas putida***

Biological Treatment Of Dye Solution Containing Malachite Green By *Macroalgae cladophora* sp.

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Abstract

In recent years, the ability of macroalgae on decolorizing of textile wastewater has, which one containing organic dyes received great attention. In this paper biological decolorization of triphenylmethane dye, Malachite Green, by Cladophora species was investigated. The algal species was acquired from natural lake and used immediately. According to its morphology and microscopic observations, it is identified as Cladophora species belonging to green algae. The effect of operational parameters such as temperature, pH, initial dye concentration and algal weight on biological decolorization efficiency was examined. Results indicated that uptaken dye amount increased with increasing initial dye concentration in the range of 2.5-17.5 ppm. Decolorization efficiency was also increased with an increase the amount of alga, reached the optimal value of algae amount (4g fresh weight) and then became constant. The stability and efficiency of the algae in long-term repetitive operations were also examined. Accordingly, it could be stated that the complete removal of color (10ppm), after selecting optimal operational parameters could be achieved in a relatively short time, about 7 h.

Keywords: **Biodegradation, Malachite Green, *Cladophora*, Macroalgae, Decolorization**

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Slurry-Phase Biological Treatment Of Nitrophenol Contaminated Soil Using Bioaugmentation Technique

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Abstract

P-nitrophenol (PNP), a nitroaromatic hydrocarbon, can be discharged in soil matrices during the production, distribution, and application of pesticides, insecticides and drugs. Therefore, rapid removal and detoxification of this compound is necessary. In this study, PNP biodegradation was investigated by using a microorganism which was selected among a microbial collection. Among the seven microorganisms examined in aqueous phase, Alcaligenes faecalise showed the maximum tolerance threshold against PNP toxicity and PNP biodegradation. Afterward, in order to investigate PNP biodegradation in contaminated soils, experiments were carried out in slurry phase for 21 days. Results at two initial PNP concentrations of 25 and 50(mgkg-1) showed 75 and 50% decrease in PNP amount in soil slurry, respectively. Our results indicate that A. feacalise has potential for use in in situ bioremediation of PNP-contaminated sites.

Keywords: **Alcaligenes Faecalise, Aspergillus Terreus, Bioremediation, Contaminated Soil, Nitrophenol**

Toluene Removal From Air in A Biofilter Inoculated With *Phanerochaete chrysosporium* Under Intermittent Loading

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Abstract

To investigate the performance of a compost biofilter treating toluene vapor during intermittent loading, a biofiltration system was set up. This system was inoculated with a special type of white-rot fungus, Phanerochaete chrysosporium. The system was operated 10 h a day on 0.096, 0.024, 0.06 m3/h of air flow rates, and 173.1 and 52.4 mg m^{-3} of pollutant concentration. Maximum removal efficiency obtained about 92%. The fungal biofilter showed its robustness to the alterations in inlet toluene concentration and gas flow rate. The kinetic of biological reaction was studied by application of Monod type equation. The kinetic constants Km and rm are evaluated as 3.495 g m^{-3} and 50 $gm^{-3}h^{-1}$, respectively. The results confirmed that the fungal system could effectively remove toluene in such a harsh condition without adding excess nutrient solution and during intermittent loading.

Keywords: **Biofilter, Toluene, *Phanerochaete chrysosporium*, Compost, Intermittent Loading**

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The Role And Evolution Of Nanoparticle Drug Delivery Systems In Cancer Treatment

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Abstract

Nanoparticles provide new tools for drug delivery through tumor vasculature allowing direct cell access. These particles allow exquisite modification for binding to cancer cell membranes, or to cytoplasmic or nuclear receptor sites. Chemical engineering plays an important role in surface characterization and process design for surface modification. This new technology provides many exciting therapeutic approaches for targeted high concentration drug delivery to cancer cells with reduced injury of normal cells. The aim of this paper is the clarification of new developments in the use of nanoparticles as drug delivery systems.

Keywords: **Nanoparticles, Liposomes, Active and Passive Targeting, Drug Delivery Systems**

Saccharomyces cerevisiae Power Generator In A Biological Fuel Cell

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Abstract

Biological fuel cell converts chemical energy exists in chemical bonds of organic substrates to electrical energy. In this research paper, Saccharomyces cerevisiae was implemented as biocatalyst in an anaerobic batch culture for the generation of power. Metylen blue (50 μM) was used as a mediator in the anode chamber of microbial fuel cell. The substrate consumption was monitored for the incubation period of 48 hours. In every 2 hours samples were drawn for analysis. Maximum generated power was 4.5 μW and also Maximum voltage generated in the microbial fuel cell was 250 mV. The generated voltage was quite stable for the duration of 36 hours.

Keywords: **Biological fuel Cell, Metylen Blue, Electron Mediator *Saccharomyces cerevisiae*, Bioelectricity**

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The Role Of Metabolic Engineering In The Development Of Green Chemistry

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Abstract

Green chemistry as a new concept in chemical industries and the science of chemistry arose in the early 1990s and gained wide interest and support at the turn of the millennium. The twelve principles of green chemistry are generally based on generation of minimum waste, the minimum usage and generation of hazardous materials, utilization of high yield methods and production of biodegradable and non-toxic products. Achieving the goals of green and sustainable chemistry as a multidisciplinary field requires close collaboration of researchers and scientists of different expertise. This paper describes the role of metabolic engineering as a new emerging field of biotechnology in realizing the goals of green and sustainable chemistry.

Keywords: **Metabolic Engineering, Green Chemistry, Industrial Biotechnology, White Biotechnology**

Heavy Metals: Environmental Impact And Biological Methods For Their Removal

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Abstract

Heavy metals are countered as the most important environmental pollutants especially for aquatic ecosystems and the serious threat for human being health. They are easily accumulated in different tissues of organisms and can be circulated through food chains. Although there are many physical, chemical and biological methods for heavy metal removal, biological methods by using plants, algae, fungi, bacteria and proteins have been highly interested because of their suitable structure for heavy metal adsorption, cost-effective and availability. These adsorbents have different functional groups such as carboxyl, imidazole, sulfhydryl, amine, phosphate, sulfate, phenol, carbonyl and amide which are very active for binding to heavy metals. In the present paper, the impacts of heavy metals on the environmental and different biological methods for heavy metal removal especially new ones based on the recombinant DNA technology have been presented. The structure of biological adsorbents and their method for heavy metal adsorption has been also described. Generally, biological adsorption of heavy metals by using biological adsorbents especially surface display peptides are known as a new and efficient method for heavy metal removal.

Keywords: **Heavy Metal, Environmental Impact, Biosorption, Biotransformation, Bioprecipitation**