contents

Thermal Treatment of Lignin as a Function of Temperatures and Reacting Conditions

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Abstract

Samples of Kraft lignin were subjected to thermal treatment in inert (pyrolysis) at 300-350^{o}C and 400-450^{o}C and/or reacting conditions as solvolysisin different organic solvents has been studied. The pyrolysis of kraft lignin at 300-350^{o}C and 400-450^{o}C gave rise to syringol (55.16% and 31.78%, respectively) as major products in addition to phenolic monomers and other compounds. On the other hand, solvolysis of kraft lignin in formic acid as hydrogen source and in the presence of formic acid and isopropanol mixture led to the formation of 1-(4-hydroxy-3,5-dimethoxyphenyl) ethanone (acetosyringone) (42.27 and 30.96%, respectively) as the major products beside methoxylated and/or phenolic benzene compounds as well as aliphatic hydrocarbons. A free radical dominant reaction pathway is proposed to explain the products formation. Various products are formed by bond cleavages and secondary reactions.

Keywords: Kraft lignin; Pyrolysis; Solvolysis; Syringol; Free radicals

Adsorption of Some Aryl Azothieno [2,3-b]Pyridine Dyes on Sugarcane Bagasse

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Abstract

Sugarcane bagasse which was considered as agro-cellulosic wastes and has no cost value, was used as adsorbent for removal of some 4,6-dimethyl-2-(aryldiazenyl)thieno [2,3-*b*]pyridin -3(2*H*)-one dyes from aqueous solutions. The effect of dyes concentration was investigated. The extent of 4,6-dimethyl-2-(aryldiazenyl)thieno[2,3-*b*]pyridin-3(2*H*)-one removal increased with increasing the amount of adsorbent used. Adsorption data was better fitted to the Langmuir isotherm.

Keywords: Thienopyridinone dyes, Baggase, Adsorption, Langmuir isotherm, Freundlich isotherm

Corn cobs as Adsorbents for Dehydration of Ethanol-Water Mixture

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Abstract

The Egyptian Sugar and Integrated Industry (ESIIC) produce about 75 thousand ton ethanol annually. This grade of alcohol not demanded in the global market. The demanded grade is 99% alcohol and above this concentration. That is make us searching about method to convert the commercial and pure alcohol into absolute and free water alcohol. Also this method must be sheep and environmentally green.

In this article we use corn cobs, which considered agriculture waste and have no price as a water removing substance from alcohol removing water from alcohol was carried in liquid phase and at different temperatures, different weights, different sizes of corn cobs and different times.

The ethanol concentration was estimated by different methods: alcoholmeter, digital alcoholmeter, potassium dichromate, Karl Fischer (KF, water analysis procedure)[1] and conductivity method.

The concentration of alcohol obtained varied between 99% and 99.7%.

Effect of Nitrogen Sources and Vitamins Addition on Baker's Yeast Fermentation Activity

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Abstract

The source and content of nitrogen and vitamins in the fermentation medium are very important in the development of Baker's yeast production since they both affect the growth of Saccharomyces cerevisiae. Furthermore, the composition of the growth medium and the environmental conditions are known to affect the cell membrane and fatty acid composition.The aim of this work was to study the effect of nitrogen sources and biotein as well as calciumpanthonate on the biomass yield and fermentative power of baker,s yeast. Results appeared that urea was the most suitable nitrogen source than diammonium phosphate, ammonium sulphate and ammonium nitrate. In the presence of urea as nitrogen source, the yeast biomass yield reached to 152.9 g/L and the fermentation power was 1900 cm3of CO2 evolved from 10 g yeast sample that contains 28% dry matter. Markedly enhancing in biomass yield and fermentative power were obtained when biotin and calciumpantothinate added to growth.

Keywork: Fatty acid; Saccharomyces cerevisiae; Nitrogen; Biotin, Ca-pantothenaet

Cellulose Decomposing Fungi Isolated from Beet Pulp and Caught from Cultivated Soil

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Abstract

Sugar beet pulp is one of the main by-products of beet sugar manufacturing. Sugar beet pulp is primarily composed of carbohydrate that may favor the presence of fungi. Seven samples of beet pulp from Dakahlia sugar factory in Egypt were collected (one sample of every fifteen days during the beet campaign 2013) and examined for the presence of cellulose decomposing fungi on beet pulp Czapek's agar medium at 28°C. Seventeen species in addition to two species varieties belonging to 4 fungal genera were collected and identified. Also, 10 samples of dried and ground beet pulp (100 g each in nylon net bag) were buried in 10 cultivated areas in Sharkia and Dakahlia Governorates planted with 10 different crops. After 10 days, the 10 bags removed from soil and examined for the caught of cellulose decomposing fungi from soil. Seventeen species belonging to five fungal genera were isolated from these buried beet pulp samples. A total of 35 isolates of collected filamentous fungi were screened for their ability to produce cellulases. All of the tested isolates showed positive ability to produce cellulases. Most of tested fungal isolates especially those caught from soil by beet pulp possessed high producing ability of cellulase. The highly cellulase producers were belonging to *Aspergillus* (17 isolates), *Fusarium*(7), *Penicillium*(5) and *Stemphylium* (one) *Mucor circinelloides* (one) and *Trichoderma* (2).

Keywords: Sugar Beet pulp, Filamentous fungi, species and isolates

Comparison Between Batch, Fed-Batch, Semi-Continuous and Continuous Techniques for Bio-Ethanol Production from a Mixture of Egyptian Cane and Beet Molasses

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Abstract

This study aims to compare production of bio-ethanol using different fermentation methods in order to selecting the best suitable one fits industry. Fifteen % inoculum's size of *Saccharomyces cerevisiae* yeast strain (EL Tayeeb) was used in fermentation of a mixture of both Egyptian cane and beet molasses at 33°C and initial pH 5.1. Also, molasses medium was fortified by 0.5 g/L urea and 0.25g/L magnesium sulphate. The obtained ethanol level according to this study was 65.52g/L by using continuous fermentation from 15% sugar concentration, comparing to 65.13g/L and 65,52g/L in case of using semi-continuous and fed-batch fermentation, respectively from 16% sugar concentration. On the other hand, in case of the batch fermentation which used on industry scale at Abo-Korkas distillation factory, only 61.62g/L of ethanol was recorded by using 15.2% sugar concentration

Evaluating the Treatment of Sugar Industry Wastewater Using the Effective Microorganisms Formulation

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Abstract

Effective microorganism formulation (EM), a culture of coexisting beneficial microorganism predominantly consisting of lactic acid bacteria, photosynthetic bacteria, yeast, fermenting fungi and actinomycetes were investigated for their ability to remidate the sugar industry effluent. The EM formulation was evaluated for reduction of odors, total solids, biochemical oxygen demand (BOD), and chemical oxygen demand (COD) of industrial wastewater, in the sugar industry in cane season. The physical and chemical characteristics of sugar industry wastewater, including pH values, conductivity and water odor were reduced by application of EM formation. The reduction rate values were increased with increasing the incubation period. On the other hand, the turbidity was increased proportionally with time of treatment, indicating the growth of EM formulation. Interestingly, the chemical oxygen demand, total organic carbon, orthophosphate and grease and oil of the factory effluent were dramatically decreased with incubation time. The results of the study show that EM formulation has the potential effect and efficient for improving the quality of the factory effluent wastes. Such studies increase the economic feasibility for wastewater treatments, both in terms of capital investment and operating costs. Generally, the findings of this study will help the sugar company to choose a natural and sheep way for wastewater treatment. (1liter EM = 5 LE.) enough to treat 1$m^3$of wastewater.

Keywords: Effective Microorganism, Industrial Wastewater treatment, Sugar factory effluent.

Factors Affecting the Mechanical Inter-Row Cultivation for Sugar-Beet Crop in Big-Scale Projects

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Abstract

The aim of this study is to develop the mechanicalinter-row cultivation operation for sugar-beet crop at big-scale projects. The investigated parameters were inter-row cultivator forward speed (4, 5, 6 and 7 km/h), number of shares (1, 2, 3) and weed intensity (low "< 20 weed/m^2", moderate "20 - 30 weed/m^2", high "30 - 40 weed/m^2", and very high "> 40 weed/m^2"). The main results were:The maximum cultivation-efficiency of 100 % was obtained using forward speed of 4 km/h, number of shares of 3 and at low weed intensity (< 20 weed/m^2). Meanwhile, the minimum cultivation-efficiency of 58.7 % was obtained using forward speed of 7 km/h, number of shares of 1 and at very high weed intensity (> 40 weed/m^2).The maximum sugar-beet root yield of 35.5 ton/fed was obtained using forward speed of 4 km/h, number of shares of 3 and without weed. Meanwhile, the minimum sugar-beet root yield of 22.39 ton/fed was obtained using forward speed of 7 km/h, number of shares of 1 and at very high weed intensity (> 40 weed/m^2).