

Effect of Air Velocity and Solar Radiation Intensity on Performance of the Trombe Wall Heating System

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Abstract

These days, the heating system of the Trombe wall is known as one of the important passive solar energy saving technology, this system reduces the consumption of other energy sources. Optimum performance of the Trombe wall is influenced by parameters like solar radiation intensity, glass type, air flow convection on channel. In this article, the effect of air velocity variation on the glass and the Trombe wall temperature due to the thermal radiation intensity are analyzed. The results show that the glass temperature rise and the Trombe wall temperature decline are occurred by the air flow velocity increase. Results show that with increasing velocity from 0.14 to 1.2 m/s, the wall temperature is decreased to 0.81. While the glass temperature is enhanced 0.083 by the same velocity variation.

Keywords: Trombe Wall, Solar Energy, Energy Saving, Air Velocity, Solar Radiation Intensity.



A Comprehensive Review on Treatment Technologies for Tannery Wastewater Containing Chromium

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Abstract

Leather tannery industry is one of the main economic sectors in many countries and release of various recalcitrant pollutants by that is considered to be an environmental concern. To treat these wastewaters, various physical, chemical & biological methods can be used, each of which depending on the conditions, can be considered as a suitable solution for the purification & removal of chromium from these hazardous streams. Obviously, the cost-effectiveness of each method depends on several factors. In this paper, a comprehensive approach to different used technologies in the world is performed using literature review. Results are indicative of assurance and reliability of combined processes for reduction of contamination degree of tannery wastewaters. However, the ion exchange technology to recover chromium from waste streams is the most effective solution. Furthermore, electrocoagulation technology has attracted significant attention for pre-treatment of tannery wastewater due to its operational simplicity.

Keywords: Tannery Wastewater, Chromium, Biological Treatment, Electrocoagulation, Chemical Precipitation, Advanced Oxidation.

The Effect of SDS on $t_{95\%}$ of CO₂ Hydrate Formation

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Abstract

Carbon dioxide is one of the main greenhouse gases, causes global warming. Therefore, preventing this gas from entering to atmosphere is very important. The effect of an anionic surfactant, sodium dodecyl sulfate (SDS), on $t_{95\%}$ of carbon dioxide hydrate formation is investigated, in this communication. The experiments were performed in a 460 cc stirred batch reactor in temperature of (273.65 and 275.65) K and initial pressure of (2 and 3) MPa. The experimental results show that utilization of SDS noticeably decreases the amount of $t_{95\%}$ at both tested temperatures. So that, utilization of 500 ppm SDS at $T=275.65$ K and $P_0=2$ MPa decreases the amount of $t_{95\%}$ 136.09%, compared to pure water.

Keywords: Gas Hydrates, Carbon Dioxide, Global Warming, SDS.



Biosorption of Cadmium Ions from Aqueous Solution by Using *Padina Australis* Brown Algae

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Abstract

In this study, *Padina Australis* brown Alga was used for the removal of cadmium ions from aqueous solution and effect of important parameters such as solution pH, temperature, initial concentration of cadmium ions, contact time and adsorbent dosage on the biosorption process were studied. The maximum adsorption efficiency using this alga is obtained 97.39% in conditions pH, temperature, time, initial concentration of cadmium ions and adsorbent dosage of 6, 50 °C, 80 min, 20 mg/L and 6 g/L, respectively. In this research, kinetic, equilibrium and thermodynamic studies were also investigated. The results showed that the pseudo second-order kinetic model was used for consideration of kinetic behaviors and the maximum adsorption capacity was obtained 7.424 mg/g by Langmuir method. Additionally, the adsorption process was as physical, desired, spontaneous and endothermic.

Keywords: Cadmium Ion, Adsorption, *Padina Australis*, Brown Algae, Kinetic, Equilibrium, Thermodynamic Studies.

Biogas: from Production to Purification

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Abstract

Among renewable resources, biomass is the only renewable resource that can be transformed into all forms of energy. The anaerobic digestion of biomass resources provides the biogas renewable energy carrier. In addition of being renewable and adaptable to the environment, biogas also has socio-economic benefits, Because biomethane can be used as an alternative to fossil fuels in the production of heat and electricity as well as auto fuel. In this paper an overview of the biogas production process from source to end user is reviewed. First, biomass and methods of energy extraction from it, biomass resource for biogas production and history of biogas production have been introduced generally. Then, in three separate sections, the stages of biogas production, the effective factor on biogas and Principles of biogas production technology including different types of anaerobic digester model with advantages and disadvantages, described. Finally, it examines how biogas is collected from digester and biogas treatment methods, including physical, chemical and biological treatment for direct use in the supply of thermal and electrical energy and as an option for use in internal combustion, micro turbines and fuel cells for power generation.

Keywords: Biomass, Anaerobic Digestion, Biogas, Biogas Treatment, Power and Heat Generation.



Study of the Effects of Osmotic-Ultrasonic Pretreatment Conditions on the Moisture Loss, Solids Uptake, and Water Rehydration Process of Tomato Flakes

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Abstract

The objective of this article is to use a combined pretreatment of Osmosis-Ultrasonic and investigate its effects under different operational conditions on parameters of water lost amount, intake of solids and rehydration ability of samples after drying process. Tomato layers with different thicknesses of 4 and 8 mm are cut and put in osmotic solutions by different sodium chloride concentrations, exposed to ultrasonic process by various time periods. The results showed that the rehydration is reduced by increasing pretreatment time, also, increase the amounts of water lost and solid intake is observed by increasing in osmosis-ultrasonic time and concentration of osmotic solution. The amounts of water lost and solid intake are decreased by thickening the layers. So combined pretreatment of Osmosis-Ultrasonic tomato layers was improved the drying process sliced tomato.

Keywords: Tomato, Osmosis-Ultrasonic, Rehydration Process, Drying.

Experimental Investigation of Drying Kinetics of Corn Grain in a Counter-Current Continuous Dryer Equipped with Inert Particles

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Abstract

In this research, drying kinetics of corn grains in a countercurrent continuous dryer at different operating conditions was investigated. A factorial experiment was conducted in a completely randomized design with three replications. Results showed that the dual interaction effects of all the parameters on the moisture content of the grains were significant and other interaction effects were not significant. Accordingly, drying rate of grains increased by increasing the drying air temperature, air velocity and mass flow ratio of inert particles to the grains as well as decrease in grain velocity through the drying bin. The best drying condition based on drying duration was achieved when air temperature, mass flow rate of drying air and mass ratio of inert particle to the grain as well as mass flow rate of grain through the drying bin had the values of 70°C, 1.5kg/min, 3 and 0.17 kg/min, respectively.

Keywords: Inert Particles, Corn, Counter-Current Dryer, Drying Kinetics.