Graphene oxide based nanocomposite membrane for efficient CO_2 separation

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Abstract: Graphene oxide (GO) is a one-atom-thick two dimensional material which has unique mechanical, electrical and structural properties. Recently, the attempt to apply GO in gas separation membranes has attracted increasing attention due to the molecular sieving effect of the controlled GO defects and its potential to form high efficient gas flow channels. However, most current works focus on the flat sheet GO membrane prepared via filtration or blending, and performance of the GO nanocomposite hollow fibre membranes still remain poorly understood.

In this study, a series of hollow fibre gas separation membranes were prepared with GO and PEBAX® as the selective layer via a dip coating method on commercial PVDF microfiltration membrane surface. Prior to the GO/PEBAX coating, the support membrane was initially coated with a layer of PTMSP in order to minimize the penetration of the GO/PEBAX into the membrane pores. The gas separation results under room temperature revealed the GO content had significant effect on the membrane performance. With the increase of GO content in the PEBAX layer, the CO_2 permeance of the composite membrane firstly decreased then increased. GO nanosheets are impermeable to gases, thus the presence of GO layer inside the PEBAX would increase the membrane resistance. On the other hand, the confined laminar structure also hindered the crystallization of PEBAX, which led to higher free volume near the polymer-GO interface, which provided high efficient gas transport channels and resulted in higher permeance. The optimized GO/PEBAX nanocomposite membrane could improve the membrane permeance by 50 % while remain the selectivity unchanged when compared with pure PEBAX benchmark.

Keywords: gas separation, graphene oxide, membrane.

1 Introduction

Organic-inorganic mixed matrix membranes have been prepared for gas separation purposes and they have shown promising gas mixture separation performance. The basic concept of the mixed matrix membrane for gas separation is based on either selective adsorption or molecular-sieving mechanisms. Recently, the application of the graphene based materials is considered promising for gas separation membrane preparation. The special one carbon atom thick structure could potentially provide separation function with minimized transport resistance and maximized permeation flux. In addition, the graphene material has good mechanical strength and conductivity, which could also provide unique functions to the membrane [1].

However, the membranes prepared with pure graphene sheets have been proved to be impractical for gas separation as even the smallest gas molecules like hydrogen and helium can't permeate through the sheet. Recently, porous graphene sheets with nitrogen-functionalized subnanometer pores has been investigated for gas separation, and it exhibited superb gas separation performance. However, due to the strong aggregation tendency, the use of such materials for membrane preparation is still challenging. In addition, the free standing graphene membrane with no substrates is too brittle thus difficult to use in practical applications. The growth of graphene layer on an inorganic membrane surface, on the other hand, is difficult and costly. Therefore, more advanced approaches are required to prepare the graphene based organic membranes.

The most commonly applied gas separation polymeric membranes are glassy polymers, for example polyimide (PI), polyamide (PA), polycarbonate (PC), polysulfone (PSf), polyphenylene oxide (PPO), cellulose acetate (CA) and their derivatives [2, 3]. The main separation mechanism is based on the size sieving by the rigid chain structures. However, the CO_2 permeation rates were not satisfactory to deal with large volume industrial scale applications such as flue gas separation and natural gas purification. On the other hand, the membranes prepared with rubbery polymer have higher CO_2 permeability due to the flexible chain structure. However, their low selectivity is detrimental. In order to solve this problem, the application of co-polymers containing both glassy and rubbery chains has been investigated. Pebax® (tradename of Atofina company for polyether (PE)-block-polyamide (PA) copolymer (PEBA)) is a commercialized block copolymer containing –N-H-, H-N-C=O, and O-C=O groups, and it has been proven to have satisfactory CO_2 separation performance [4].

One major challenge to prepare the graphene functionalized membrane is to control its stacking structure, which has strong connections to the membrane gas separation performance. We thus applied the dip-coating technique in this work, trying to form a thin coating layer with parallel staked graphene sheets with the assist of gravity.

In this study, the Pebax/graphene oxide (GO) composite gas separation membranes were prepared with PVDF microfiltration membrane substrates. The membranes were pre-coated with PTMSP gutter layer to minimize the penetration of the Pebax layer into the membrane pores. Several different graphene oxide concentrations and coating cycles were tested and compared to optimize the performance of the composite membrane.

2 Results and discussion

2.1 Characterization of the composite membrane

The SEM images of the PVDF-PTMSP-Pebax/GO nanocomposite membranes are shown below in Figure 1. The coating layer thickness was around 1 micron and the parallel stacked GO sheets were clearly visible in the cross-section images, and the nanosheets were evenly distributed within the Pebax layer. Such an observation is preferable as the formed nanoscale flow channels between the neighbouring GO sheets would provide higher concentration gradient for CO_2 transport and thus potentially improve the permeability. In terms of the surface morphology, the addition of GO would increase the surface roughness. The membrane surface without GO sheets was smooth and even (results not shown), and with the addition of GO sheets, the formation of hills and valleys was clearly observed on the membrane outer surface.

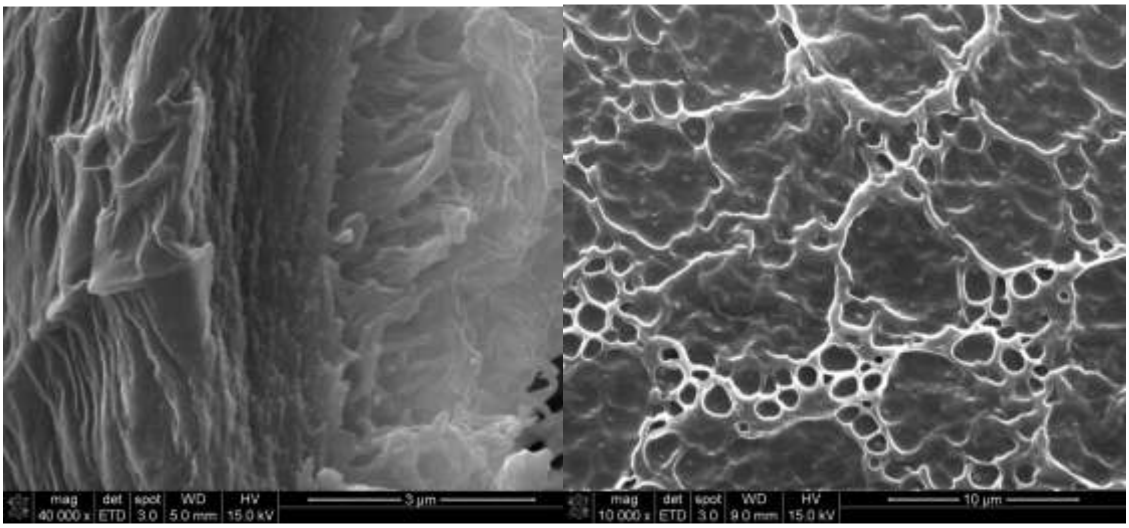

Figure 1: SEM image of the composite membrane (left: cross-section, right: outer surface)

2.2 Gas permeation test with the composite membrane

The content of GO in the Pebax layer had significant effect on the membrane performance. As shown in Figure 2, the addition of GO into Pebax layer would increase the permeability of CO_2 gas, and the highest value was achieved when 0.1 wt % GO was applied. On the other hand, the CO_2/N_2 selectivity of the membrane was relatively unchanged with the addition of GO sheets (CO_2/N_2 selectivity: 40±5). As presented above, the addition of GO would form a series of parallel flow channels for the membrane, and when CO_2 passed through these channels the confined space would provide higher concentration gradient, which eventually increased the gas permeation rate. On the other hand, the presence of GO within the Pebax layer hindered the crystallization of the polymer, leaving void flow channels near the polymer/GO surface. Such channels provided high efficient gas transport through the membrane thus facilitated the gas transport. However, the addition of the GO sheets had negative effect on the CO_2 separation mechanism through the Pebax layer thus the selectivity was relatively unchanged. When the GO content was higher than 0.1 wt %, the impermeable layers provided extra mass transfer resistance for CO_2 to pass through the membrane, thus the permeation rate was significantly reduced. The proposed mixed matrix membrane gas permeance is presented in Figure 3.

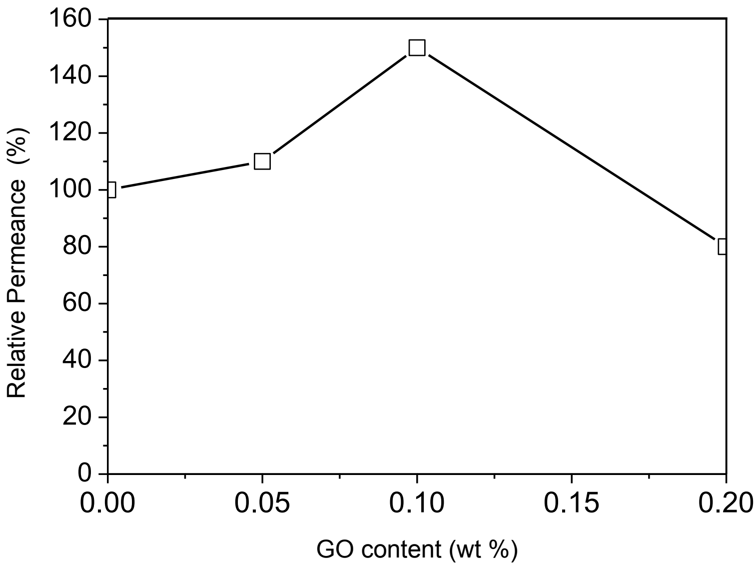

Figure 2. Change of CO_2 permeance and selectivity with different GO content (2 coating cycles)

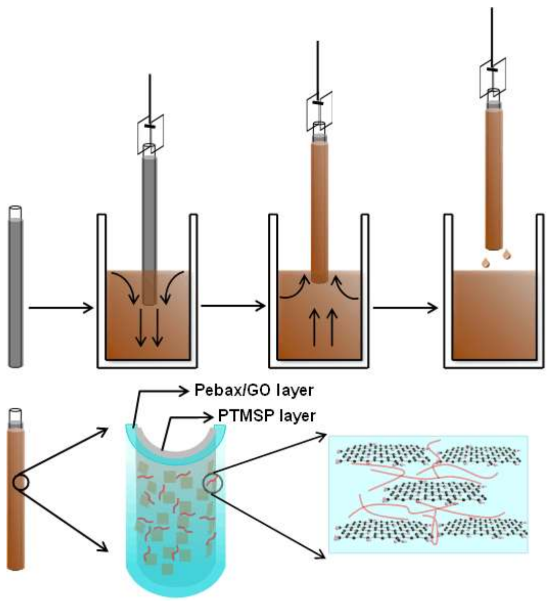

Figure 3. Schematic diagram of the dip coating and gas transport through the GO/Pebax layer

3 Conclusions and recommendations

This work prepared a series of the Pebax/GO based nanocomposite membranes and tested them for CO_2/N_2 separation. The results indicated the presence of GO within the selective layer had significant effect on the membrane performance. The addition of GO into the Pebax layer would form high efficient nanoscale flow channels for CO_2 gas, which further improved the membrane gas separation performance. However, the detailed mechanism of the GO sheets inside the membrane was still poorly understood and further investigation is thus required.

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Presenting author biography

Jingwei Hou received his Ph.D. degree at the University of New South Wales in the area of biocatalytic membrane for wastewater treatment and gas separation in 2015. After completion of his Ph.D., he joined the UNESCO Centre for Membrane Science and Technology at the University of New South Wales as a research associate. His current research interests include gas separation membrane, biocatalytic membrane reactor and gas-liquid membrane contactor.

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| Conference Paper | 01 January 2015

Prediction of particle size distribution in hydrometer test analysis using LSSVM algorithm

Pages: 1–13

Preview Abstract

In this work, hydrometer experiment is utilized to measure the percentage of sand, silt and clay in the in organic fraction of a multicomponent soil sample. When a specimen is dispersed in water, the particles settle at different velocities depending on ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Synthesis of zeolite monolith by steam-assisted crystallization of gel molded by ice-templating

Pages: 14–20

Preview Abstract

Zeolite monolith with three-dimensionally interconnected macropores was synthesized by ice-templating and steam-assisted crystallization (SAC) by using a structure-directing agent (SDA). The precursor silica gel was prepared by applying ice-templating to ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Bridging the gaps between USA regulatory heritage and Australian model work health and safety major hazard facility compliance requirements

Pages: 21–33

Preview Abstract

There were three key objectives to this paper. The first objective was to compare the Australian model Work Health and Safety Act and Regulations 2011 major hazard facility requirements to the equivalent United States of America (USA) federal process ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Analysis of mean free path in Fluidisation using discrete element method

Pages: 34–42

Preview Abstract

Fluidized beds are commonly used in Chemical Engineering as they provide a large degree of mixing and segregation of solids as well as a large surface area that enable effective heat transfer processes. However, the complexity of the relationships between ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Supercritical route for green materialds

Pages: 43–46

Preview Abstract

Green materials processing is a philosophy of chemical research and engineering to encourage the design of products and processes that minimize the use and generation of hazardous substances, which involves 1) contribution of products to minimize ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Solubility of ibuprofen in aqueous ethanol at low ethanol contents

Pages: 47–54

Preview Abstract

The solubility of ibuprofen was measured in water (W) - ethanol (E) mixtures from 0 to 50% w/w ethanol in solvent at 10, 25 and 40 degreesC by the dissolution method using UV spectrophotometry to determine the ibuprofen concentrations. The UV calibration ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Investigation of reactive flash volatilization of cellulose for syngas production using the ASPEN PLUS simulator

Pages: 55–63

Preview Abstract

Reactive flash volatilization (RFV) integrates flash pyrolysis with catalytic gasification in a single millisecond residence reactor (RFV gasifier) for producing clean syngas from biomass. The RFV gasifier is a down flow reactor with a preheated fixed-bed ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Breakage behaviour of wet granules in a breakage-only high-shear mixer

Pages: 64–72

Preview Abstract

In high-shear wet granulation, breakage and attrition play an important role. However, the breakage and attrition rate process is the least understood among all rate processes. To understand the breakage and attrition phenomena, experiments were performed ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of acoustic perturbation on the bed of nanopowder

Pages: 73–80

Preview Abstract

The present work investigates the effect of acoustic perturbation on the behaviour of bed of nanopowders. Due to strong agglomeration behaviour of ultrafine nano-particles, significant nonhomogeneities are observed in the bed. This leads to a loss of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Embedded integrator model predictive control (MPC) based hybrid observer for polymerization reactor control

Pages: 81–89

Preview Abstract

This paper described the development of an embedded integrator type model predictive control (MPC) based on the state estimated by a hybrid observer namely fuzzy-sliding mode observer (Fuzzy- SMO). Embedded integrator means that an integrator has been ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A new empirical correlation for entrained droplet fraction prediction in cocurrent gas-liquid annular two-phase flow in large diameter pipes

Pages: 90–101

Preview Abstract

Production tubing from gas wells generally contains multiphase mixtures of gas condensates, oil and water in what is termed wet gas. The dominant flow pattern is annular where the liquids flow along the pipe inner periphery and the droplet laden gas phase ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Simulation, heat integration and economic analysis of coal IGCC power plants with carbon dioxide capture

Pages: 102–113

Preview Abstract

Integrated gasification combined cycle (IGCC) power plants with carbon dioxide capture and storage (CCS) have been identified as promising technology for reducing their CO2 emissions. Even that most of this technology's components are commercially ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Numerical simulation research for chemical engineering applications in heat transfer using visual basic for application (VBA) programming

Pages: 114–120

Preview Abstract

Microsoft Excel (MS Excel), a spreadsheet application by Microsoft Corporation that features a macro programming language called Visual Basic for Applications (VBA) is employed as an engine for the development of numerical simulation programs for Chemical ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Homogeneous catalytic conversion of syngas into methanol

Pages: 121–126

Preview Abstract

More than 100 million tonnes of methanol (MeOH) is produced each year, most of which is used as a feed-stock for the production of other chemicals. But over past years methanol has become a subject of research as an emerging new source of energy and fuel. ...

ABSTRACT | PDF/EPUB

| 01 January 2015

Novel synthesis of mesoporous nanosized stoichiometric mullite composition powder

Page: 127

PDF/EPUB

| Conference Paper | 01 January 2015

Tri-reforming of methane for the production of syngas: Review on the process, catalysts and kinetic mechanism

Pages: 128–136

Preview Abstract

The reforming of methane is considered as one of the industrially important process for decades, as the process converts natural gas to valuable syngas (a mixture of H2 and CO). There are three major reforming processes, which are classified based on the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Separation of albumin suspended in water with submilli-bubbles

Pages: 137–146

Preview Abstract

To separate albumin fine particles suspended in water, a novel flotation technology using bubbles smaller than 1 mm was developed. The albumin concentration decreased with increasing aeration rate. The albumin fine particleswere adsorbed on bubble surface ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Systematic approach for the design of trigeneration systems based on reliability aspects

Pages: 147–157

Preview Abstract

Trigeneration systems are utility systems which produce heat, power and cooling simultaneously. With its highly integrated system of process units, applying trigeneration systems in industrial sites, would reduce external grid power consumption and ...

ABSTRACT | PDF/EPUB

| 01 January 2015

Mechanical, structural and surface modification of ultrafiltration membranes pre-treated with ethanol

Page: 158

PDF/EPUB

| Conference Paper | 01 January 2015

Residence time distribution study for bubbling fluidized beds using computational fluid dynamics

Pages: 159–167

Preview Abstract

Fluidized beds find application in a variety of chemical engineering operations that range from separations to catalytic reactions. The fluid-solid flows that occur in the fluidized bed are inherently unsteady. This poses a challenge for effective ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Thermal analysis of resin composites as a function of fundamental structural parameters

Pages: 168–176

Preview Abstract

Effective thermal conductivity of composites is analyzed using a homogenization method. This method can precisely represent the microstructure of a composite with ellipsoidal fillers. Here, the effects of parameters such as the volume fraction, the shape ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Gold mineralisation in selected bio-oxidised refractory gold concentrates

Pages: 177–188

Preview Abstract

The nature of gold (Au) mineralization in and association with host gangue minerals play very key role in the extraction rate and yield for any gold ore processing industry. In this paper, the gold mineralization in and association with host gangue ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Post-BIOX physical surface activation of refractory flotation concentrates for improved gold recovery

Pages: 189–198

Preview Abstract

Formation of refractory secondary sulphate (RSS) minerals during biological oxidation (BIOX) and post- BIOX lime neutralisation have serious implications on the alkaline cyanide leaching stage. In this paper, physical surface activation (PSA) of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Fabrication of effective microchannels using 3D-printer based on new design concept of micromixers

Pages: 199–201

Preview Abstract

Rapid and precise mixing is a key operation in micro reaction technologies. Villermaux- Dushman protocol is popular and convenient for evaluating mixing quality. However, mixing history is averaged and disguised in this system. To build more efficient and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Flow Synthesis of plasmonic nanoshells and patchy particles via a microreactor

Pages: 202–205

Preview Abstract

Dielectric core/metallic shell type composite particles are promising for biomedical applications due to their unique optical and chemical characteristics, although the problem lies in the synthetic process. They are typically synthesized via batch type ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Energy optimisation in a fully integrated phosphate chemicals facility

Pages: 206–217

Preview Abstract

The development of large scale integrated phosphate chemicals plants often requires large amounts of energy to operate. The various process plants in a phosphate chemical facility includes the mine, beneficiation plant, sulphuric acid, phosphoric acid, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Transparent conductive oxides nanopaticles: Their synthesis and nanoink

Pages: 218–231

Preview Abstract

Among Transparent Conductive Oxide (TCO) materials, indium-tin-oxides (ITO) thin film is prepared by the sputtering process with ITO target, but only 20% of ITO yielded from the target is deposited on the substrate. Namely, about 80% ITO is exhausted by ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Dissolution of South African corncob in inorganic hydrate salts (ZnCl2.xH2O) towards efficient biocatalytic depolymerisation

Pages: 232–243

Preview Abstract

A major challenge to agro-industrial waste management, beneficiation and applicability for productive processes is biomass recalcitrance. As a result, sustainable, cheap and effective pretreatment techniques designed to make such waste biomass process-...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Design of an artificial neural network for altering outputs of sweetening section of a gas refinery

Pages: 244–254

Preview Abstract

In this study, artificial neural network (ANN) has been used for manipulation of results of the sweetening absorption column of Bidboland Gas Refinery located in the south-western part of Iran. Sour gas flow rate, Sour gas

temperature, H2S of sour gas, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Antimicrobial packaging for biomedical applications from a biodegradable polymer

Pages: 255–261

Preview Abstract

Sterilization of medical devices and packages is one of the major challenges in the biomedical field. In this study, we have developed antimicrobial material from poly(propylene carbonate) (PPC). PPC is a biodegradable polymer that is synthesized from ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Study of the particle flow and mixing behaviours in a blade mixer by finite element method

Pages: 262–265

Preview Abstract

In this paper, a numerical model based on the Eulerian finite element method (FEM) recently proposed [1] is established to study the particle flows and mixing behaviours in a blade mixer. The model treats the granular material in the cylindrical mixer as ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Transport of monosaccharides contained in an ionic liquid/aqueous mixture via a supported liquid membrane

Pages: 266–273

Preview Abstract

Lignocellulosic materials are renewable biomass that can be utilized in the development of biofuels such as ethanol. Hydrolysis of hemicellulose and cellulose, contained in pretreated biomass, produces monosaccharides that are fermented to produce ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Maximisation of fluid mixing in 2D channel flows using non-uniform electro-osmotic fields

Pages: 274–285

Preview Abstract

Mixing of fluids is of great value in many applications. Oscillatory and pulsatile flows can enhance mixing by generating high shear oscillations. Electro-osmosis is a phenomenon where external electric fields induce flow in fluids that are in contact ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Gas Hydrate Equilibrium measurement of methane + carbon dioxide + tetrahydrofuran+ water system at high CO2 concentrations

Pages: 286–290

Preview Abstract

Application of gas hydrate in separation of CO2 form nitrogen in CCS chain is recently studied by many researchers. THF is suggested as promoter of this process. The same process can be suggested for separation of carbon dioxide from methane for gas ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A perfused membrane biofilm reactor for microalgae cultivation in tropical conditions

Pages: 291–301

Preview Abstract

Microalgae have potential to be used as a sustainable raw material in a wide range of applications, such as animal feed, biofuels and green chemistry. New cultivation systems are under development in order to improve productivity and system efficiency. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

CFD modelling of a tubular reactor for methanol synthesis

Pages: 302–311

Preview Abstract

Methanol is traditionally produced by the reaction of synthesis gas, a mixture of CO and H2), catalysed by heterogeneous CuZnO/Al2O3 catalysts. The reaction is an exothermic, equilibrium controlled reaction that favours lower temperatures (493-523 C) and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Heavy metals removal from wastewater by adsorption process: A review

Pages: 312–317

Preview Abstract

Heavy metals are toxic and detrimental water pollutant. Their presence not only affects human beings but also animals and vegetation because of their mobility in aqueous ecosystem, toxicity and non-biodegradability. Removal of heavy metals from the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Challenges in UASB reactor system design: A review

Pages: 318–325

Preview Abstract

Tropical countries such as India have a lot of scope for anaerobic wastewater treatment due to the fact that for most part of the year temperature remains above 20 degreesC. This led to growing interest in developing new or modifying existing anaerobic ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Significance of powder breakdown during in-plant transport at industrial milk powder plants

Pages: 326–334

Preview Abstract

Instant whole milk powder (IWMP) is designed to rapidly dissolve in water, which depends on the particle size distribution (PSD) and agglomeration. The warm and delicate milk powder exiting the dryer is transported via either pneumatic conveying or bucket ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Principles and policies for sustainable use of Australia's natural gas

Pages: 335–341

Preview Abstract

Australia's natural gas resources support major sectors of the Australian economy, as well as growing international demands. Export opportunities raise questions about reservation policies to ensure adequate local supply at an appropriate cost. Australian ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Thermodynamics study of photofermentative biohydrogen production using Rhodobacter sphaeroides and pre-sonicated effluents as a combined substrate

Pages: 342–349

Preview Abstract

Thermodynamic analysis of photofermentative biohydrogen production using pre-sonicated combined effluents from both palm oil (25% v/v) plus pulp and paper mill (75% v/v) effluents was investigated in this study. Batch experiments of photofermentation were ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

The use of image analysis to characterise activated sludge flocs

Pages: 350–361

Preview Abstract

The activated sludge process is a widely used method of biological wastewater treatment. Many operational aspects can be directly related to the physical characteristics of the sludge flocs, in particular the prevalence of protruding filamentous bacteria, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Nonlinear stability analysis of anaesthesia control system using circle criterion

Pages: 362–368

Preview Abstract

Stability analysis of the anaesthesia control systems due to system nonlinearity has not been well studied in the literature. This paper studies the sufficient conditions for absolute stability in an anaesthesia control system under uncertain ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Characteristics of double salt based high-temperature carbon dioxide sorbents

Pages: 369–370

Preview Abstract

Due to the excess use of fossil fuels, massive amount of carbon dioxide (CO2) has been emitted to atmosphere and causes serious environmental problems. With the awareness of this problem, there have been efforts for reduction of CO2 emission. As a ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Energetic feasibility of milking process for algal fuel production using biofilm photobioreactor for growth of microalgae

Pages: 371–376

Preview Abstract

High energy consumption is the major constraint for producing fuel from microalgae on commercial scale. Harvesting of microalgae is responsible for the most of the energy consumed in the process. Wet extraction method has been suggested to reduce the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Technical and non-technical considerations on design of safety instrumented functions (SIF)

Pages: 377–383

Preview Abstract

The industry standard for safety instrumented system (SIS), IEC 61511, requires that safety integrity levels (SIL) be established for safety instrumented functions (SIF). Plant operators as well as design engineers fully agree an importance of SIF meeting ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Ionic liquid mixture design for carbon capture using a systematic visual approach

Pages: 384–395

Preview Abstract

Conventional carbon dioxide (CO2) capturing solvents possess a number of drawbacks such as high regeneration energy requirement, solvent loss, and solvent degradation. Ionic liquids (ILs) have been introduced as potential replacement to these solvents, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A preliminary simulation of strategies for cooling of air in buildings with unplanned traffic flow during summer

Pages: 396–405

Preview Abstract

Many buildings with varying traffic flow, such as public buildings and hotels, do not have a quantitative strategy to manage energy use. Energy use, although seasonal, is difficult to predict, and a consequence can be wasted energy. During summer months, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Modeling and design of the high-purity gypsum production process

Pages: 406–411

Preview Abstract

It is important to treat the by-product lime from the circulating fluidized-bed unit which is used for petroleum coke refueling. An effective method has been developed to add up together byproduct lime, water and acid to make high-purity gypsum which is a ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Implementation of a model based advanced process control scheme across two ethylene plants

Pages: 412–415

Preview Abstract

A plant wide, model based, Advanced Process Control (APC) scheme has been implemented to enable the Qenos Altona Olefins (ethylene) site to take advantage of high feed availability scenarios.

 Maximising utilisation of a highly variable feed ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Shear induced densification of flocculated aggregates - characterising the effects on rheology

Pages: 416–424

Preview Abstract

Predicting full-scale thickener performance, including the solids flux and concentration from a thickener underflow has long been the holy grail of thickener design and operation. A number of researchers have developed thickener models to predict actual ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Solid-liquid mass transfer in an agitated ion exchange vessel fitted with dual impellers

Pages: 425–432

Preview Abstract

Solid-liquid mixing in agitated vessels are widely utilised in industry where there has been a demand for process intensification. It has been shown that the impeller power required per unit mass solid (ejs) to achieve just off-bottom solid suspension (...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Project learning opportunities with biodiesel

Pages: 433–443

Preview Abstract

The production and testing of biodiesel presents a range of opportunities for project-based learning for Chemical Engineering students. Potential projects include biodiesel production, washing, storage, blending with other fuels, measuring key biodiesel ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Monitoring of mean particle size during emulsion polymerisation reactions using visible and near infrared diffuse reflectance spectroscopy

Pages: 444–449

Preview Abstract

Near infrared (NIR) spectroscopy has been investigated as a tool for monitoring emulsion polymerisation reactions using multivariate calibration models for estimating mean particle size and monomer concentration. While the models were promising, the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Mapping efficient teaching practices against personal teaching methods

Pages: 450–455

Preview Abstract

The academic environment where we serve is highly competitive with many different tasks that continuously challenge us. We end up juggling teaching, research and administrative work. In particular, new lecturers are often left on their own to develop ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Kinetics of particle settling during solvent evaporation

Pages: 456–462

Preview Abstract

Simulations based on the Discrete Element Method have been carried out in order to study the kinetics of 100 nm particle deposition during solvent evaporation. The solvent properties were considered to be similar to water and the particles possessed a ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Process safety considerations in coal seam gas (CSG) wellhead surface facilities

Pages: 463–469

Preview Abstract

Coal seam gas has developed as a major industry in Australia in little more than a decade. Thousands of wells and surface facilities will be installed to supply gas for local consumers and Liquefied Natural Gas (LNG) plants. The objective of this paper is ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Examining the role of water in performance of solid oxide fuel cells; an isotopic investigation

Pages: 470–480

Preview Abstract

Pressure to reduce greenhouse gas emissions associated with energy production and broaden the feedstock of carbon-based fuels used in electricity generation has lead to significant research in the use of waste products for electricity generation. The ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Nano-gold supported on Hydrotalcite catalyzed solvent-free selective oxidation of benzyl alcohol to benzaldehyde

Pages: 481–485

Preview Abstract

Nano-size gold particles deposited on MgO by the homogeneous deposition precipitation showed very high catalytic activity with nearly 100 % conversion of benzyl alcohol in a short reaction period and more over showed excellent reusability in the process. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Atmospheric emissions from the co-combustion of biomass tars and synthesis gas during biochar and bioenergy production

Pages: 486–495

Preview Abstract

Small, distributed biomass energy and biochar production systems using pyrolysis is one of the potential options to effectively process and utilize biomass resources on site of cultivation. Cocombustion of the biomass tar and synthesis gas products in a ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Reactive extraction of succinic acid from aqueous solutions using Tri-N-Octylamine (TOA) in 1-decanol: Equilibria and effect of temperature

Pages: 496–506

Preview Abstract

Succinic acid is a dicarboxylic acid. Its usage has been increased as a great green feedstock for the manufacture of synthetic resins, biodegradable polymers and chemical intermediates. Production process of succinic acid by fermentation method needs an ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Investigation of flame attachment and accelerated fire spread

Pages: 507–514

Preview Abstract

On the 18th November, 1987 a London underground escalator fire in King's Cross station burnt steadily for fifteen minutes and then suddenly erupted trapping and killing thirty one people while injuring 100 more. Following this disaster there was an ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Solvent extraction of rare earth metal using continuous stirred vessel

Pages: 515–523

Preview Abstract

Dysprosium and iron were selected as a heavy rare earth metal and a major impurity in the practical feed solution and the solvent was kerosene solution of mono (2-ethylhexyl) 2- ethylhexylphosphonate (PC-88A). Firstly, each equilibrium of the metals ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Numerical study of layer inversion phenomenon in liquid fluidized beds: Effects of particle size and density ratio

Pages: 524–529

Preview Abstract

Layer inversion phenomenon can be observed in liquid fluidized beds, e.g. solid classifiers or biological reactors, which often contain a binary mixture of materials with specific properties. At low liquid velocity, the two species form distinct layers, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Corrosivity and instabilizing effects of H.S.S (heat stable salts) of secondary and tertiary amine solution in plant operation

Pages: 530–540

Preview Abstract

Amine plant operational problems, such as excessive foaming, corrosion and capacity reduction, are often attributed to the accumulation of amine heat stable salts. Carbon steel high corrosion is often attributed to the amine contaminants which cannot be ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Generating hollow capsules using the dopamine self-polymerisation system -- methods for capsule synthesis, surface and shell functionalization, and applications

Pages: 541–547

Preview Abstract

The self-polymerisation of dopamine has generated a wealth of interest, especially in the areas of drug delivery and encapsulation. However, the ideal encapsulation polymer should possess 1) ligating or chelating moieties in the shell to fixate drugs and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of thermally-induced protein solubilisation on rheology of activated sludge

Pages: 548–553

Preview Abstract

Thermal pre-treatment of activated sludge was shown as an effective method to increase biodegradability of activated sludge for higher biogas production in digesters. The underlying reason for better digestion is solubilisation of organic matter in ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Ni catalysts for hydrodeoxygenation in green diesel production

Pages: 554–561

Preview Abstract

The alumina-supported Ni catalysts have been developed for hydrodeoxygenation (HDO) of triglycerides and fatty acids to renewable green diesel in a continuous-flow trickle-bed reactor. The Ni catalysts were characterized by X-ray diffraction (XRD), ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Chemical engineering beyond 2020 - can the profession capture the new technologies?

Pages: 562–573

Preview Abstract

Chemical engineering owes its existence to UK/US pioneers who, from the 1920s, attempted to put order into the design and operation of plants to produce bulk chemicals. Concepts such as unit operations, flow-sheeting and process control appeared and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Optimisation of a hybrid multi-stage membrane and low-temperature carbon dioxide purification process

Pages: 574–582

Preview Abstract

Carbon capture and storage (CCS) is one of the technologies required to reduce the greenhouse gas emissions to limit the atmospheric concentration of CO2 to less than 450ppm. However, CCS is energy intensive. The aim of this study is to reduce the energy ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Water, energy and economic evaluation of implementing a dry sand fluidised bed separator in coal, iron ore and copper processing

Pages: 583–591

Preview Abstract

The implications of adding a dry sand fluid bed (DSFB) separator for cleaning lump coal, upgrading lump iron ore and early rejection of gangue from copper ore on the economic outcomes as well as energy and water consumed has been analysed. The analysis ...

ABSTRACT | PDF/EPUB

| 01 January 2015

Tissue-inductive injectable PEG-based hydrogels and their use in stem cell-based tissue engineering

Page: 592

PDF/EPUB

| Conference Paper | 01 January 2015

Dissolution and shrinking behavior of a microbubble in a microchannel

Pages: 593–599

Preview Abstract

Recently, a novel crystallization phenomenon that uses fast shrinking of a single microbubble in dilute solution has been reported. It is expected that a precise control of the size and the number of crystals could be possible by using this phenomenon. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of marangoni flows on mass transfer in an inkjet droplet during thin film formation: Numerical study

Pages: 600–608

Preview Abstract

A mathematical model is proposed to describe transport phenomena in a solution droplet evaporating on a flat surface. Governing equations on two-dimensional axis symmetric coordinate are numerically solved using Lagrangian finite element method. Physical ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A honeycomb-type Ni/CeO2 catalyst for CO2 methanation to transform greenhouse gas into useful resources

Pages: 609–614

Preview Abstract

The CO2 methanation is a famous reaction that calls a familiar Sabatier reaction for the hydrogenation of CO2 to CH4. To rapidly transforming CO2 to CH4, we investigated the performance of methanation over some nickel-based granular catalysts loaded on ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Energy efficiency and capital cost estimation of drying with mechanical vapor recompression and self-heat recuperation processes combined with IGCC power generation systems

Pages: 615–622

Preview Abstract

In recent years, Integrated coal Gasification Combined Cycle (IGCC) plant tends to use lowrank coals (LRC), which contain a large amount of moisture because of abundance of reserves. Drying process based on self-heat recuperation (SHR) technology has been ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

DEM simulation of flow of ellipsoidal particles in rotating drums

Pages: 623–629

Preview Abstract

Discrete Element Method (DEM) has been extensively used to study the granular flow in rotating drums, but mainly focusing on spherical particles. Particle shape is one of the major particle characteristics significantly affecting the flow behaviour of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Preparation and characterization of silica nanoparticle-cellulose nanofibre composites

Pages: 630–633

Preview Abstract

Cellulose nanofibres are an exciting low-cost new organic material. It is widely used due to the advantages such as flexibility, ductility, dielectric behaviour, processability, biodegradability and renewable in nature which replaces the conventional ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Production of agglomerates via 3D printing technology for granule breakage tests

Pages: 634–640

Preview Abstract

To improve the process design and end-product quality, it is essential to investigate the breakage behaviour of agglomerates. Discrete Element Method (DEM) simulation is commonly used but is limited by the lack of identical, controlled agglomerates to ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Electro-microfiltration concentration of whey protein using Magneli titanium sub-oxide modified ceramic membrane

Pages: 641–650

Preview Abstract

Whey protein, with the main components of a-lactalbumin (a-LA) and beta-lactoglobulin (beta-LG), derived as the by-product of cheese making process, is a nutritional supplement especially for muscle building. Its market price increases exponentially with ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Model development and analysis of hydrothermal liquefaction of microalgae

Pages: 651–660

Preview Abstract

High Lipid content microalgae are a potential source of biofuel. However, currentunit operations involved in microalgal biofuel production are energetically expensive sincemost of the energy is consumed in dewatering and drying of dilute microalgal ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Mathematical optimisation approach for synthesis of lignocellulosic biomass pretreatment system in a biorefinery

Pages: 661–669

Preview Abstract

Concerns about gradual depletion fossil fuels with climate change have promoted many initiatives for exploring alternative non-fossil energy sources. Lignocellulosic biomass (LCB) has been identified as one of the promising sustainable bio-energy sources. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effects of shear thinning fluid rheological properties on IMR radius in laminar stirred tanks

Pages: 670–677

Preview Abstract

The formation of isolated mixing regions (IMRs) in laminar stirred tanks has been a topic of interest for many years to the chemical engineering industry. In many viscous fluids these unmixed regions exist as toroidal vortices; one located above and the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Hollow fiber fabrication by electrospinning under pressurized carbon dioxide

Pages: 678–684

Preview Abstract

Electrospinning is a process for producing nonwoven fibers from polymer with average diameters in the range of nano- to micrometers. Pressurized carbon dioxide (Tc = 304 K, Pc = 7.38 MPa) is a good solvent for many nonpolar compounds and polymers. In this ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Grinding characteristics and energy consumption of two bench top grinders

Pages: 685–690

Preview Abstract

All Grinding is an energy intensive operation of pivotal importance throughout the process industries. The basis of most undergraduate courses is an introduction to three specific energy relationships, the so-called Kick, Bond, and Rittinger laws; these ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A techno-economic evaluation for industrial scale production of metal organic frameworks

Pages: 691–701

Preview Abstract

Metal-Organic Frameworks (MOFs) are crystalline materials characterised by their uniform pores with unprecedentedly large internal surface areas. Their functionality is derived by the choice of organic linkers and metal ions, resulting in a vast range of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Synthesis of copper nanoparticles using microwave irradiation technique

Pages: 702–708

Preview Abstract

It is well known that the size of the materials can drastically affect their physical and chemical properties. Applications based on nano scale materials of noble metal have the potential to exploit their properties in various fields ranging from ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Modelling of gas flow and liquid spray in wet type electrostatic precipitators

Pages: 709–720

Preview Abstract

Wet Electrostatic Precipitator (ESP) can effectively remove fine particular matters from many industry emission sources. The wet ESP normally applies water spray, or running water on the collecting electrode. Particularly, a falling water film is created ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Multivariate industrial alarm design based on quantitative and dynamic risk assessment

Pages: 721–731

Preview Abstract

In modern industrial processes, massive alarms generated by the large annunciator amount, improper alarm design, and complex interconnections among process components always keep operators overwhelmed and incapable of taking timely and effective measures ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effective transesterification of model plant oil by countercurrent multistage reactor

Pages: 732–740

Preview Abstract

The production of biodiesel from inedible oils, such as crude jatropha and used frying oils, for biodiesel production has been studied. According to the specification of the biodiesel fuel oil, the total unreacted glycerides in the product biodiesel is ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Evaluation of geothermal heat in Australian gas processing plants

Pages: 742–754

Preview Abstract

Australia has a number of gas processing plants which process the raw natural gas to produce saleable natural gas at a required composition and quality. Due to the various energy requirements throughout the processing plants, a fraction of the saleable ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Kinetic model for the prediction of ultra low sulphur diesel reactor performance

Pages: 755–763

Preview Abstract

The gasoil (Diesel) hydrodesulphurization (HDS) unit to produce Ultra Low Sulphur Diesel (ULSD) is a key process in petroleum refineries to produce diesel that meets the sulphur specifications to meet environmental regulations. The deep desulphurization ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Commercial viability of photoreactors in textile wastewater treatment hindered by Titanium dioxide (TiO2) deactivation

Pages: 764–774

Preview Abstract

Water treatment industry should focus more on water recycling and reuse due to global water shortages as a result of climate change and the increase in volume of toxic and recalcitrant industrial effluents from textile, pharmaceutical and pesticide ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Optimising pulp and interfacial chemistry and electrical energy input for electroosmotic consolidation

of Na-exchanged smectite clay pulps

Pages: 775–787

Preview Abstract

Electroosmotic (EO) consolidation of clay-rich mineral waste tailings has been investigated as an alternative, cost-effective dewatering technology for several decades in laboratory and pilot scale studies. Despite generally promising results, often ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Genetic modifications of 'Aspergillus terreus' for enhanced Malonyl-CoA production

Pages: 788–793

Preview Abstract

Selectively altering the metabolism of 'Aspergillus terreus' (A. terreus) is of considerable interest as a way of altering the carbon flux and improving the selective production of secondary metabolites such as lovastatin, a medicine with statin activity. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of double stage paddle impeller setting conditions on the structure of the streak lobe in laminar mixing vessel

Pages: 794–800

Preview Abstract

In order to estimate the mixing performance of an impeller in a laminar flow vessel, it is necessary to consider the flow pattern and the mixing mechanism. In fact, the structure of the streak lobe extending from the tip of the impeller blade is closely ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Photocatalytic Synthesis of p-Anisaldehyde by Using WO3 under visible light

Pages: 801–811

Preview Abstract

p-Anisaldehyde (p-MB) is an important intermediate in perfumery and pharmaceutical industries. However, its existing processes involve harmful catalysts/byproducts. While the photocatalytic synthesis of p-MB has been examined as an alternative clean ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

PosiDAF: Simplifying flotation for algal cell separation

Pages: 812–820

Preview Abstract

Microalgae separation has to be undertaken in drinking water treatment plants, advanced wastewater treatment plants and in algae harvesting, where algae might be used to produce biofuel or nutraceuticals. Potential separation processes include ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Optimization of alkaline delignification of rice husk biomass during cellulose pulp production

Pages: 821–831

Preview Abstract

Delignification plays an important role during the production of cellulose pulp (CP) from any kind of lignocellulosic biomass for miscellaneous applications. Recently CP is extensively used to produce nanocrystalline cellulose (NCC). The main objective of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Oxidative modification to bloodmeal protein after decolouring with peracetic acid

Pages: 832–843

Preview Abstract

Bloodmeal, a protein-rich by-product of the slaughterhouse industry makes an ideal feedstock for protein based thermoplastics. The dark red-brown colour of heme present in bloodmeal can be degraded via oxidation through the use of equilibrium peracetic ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

New pathway for the production of crotonic acid

Pages: 844–849

Preview Abstract

Industrially important chemicals such as propylene, butanol, acrylic acid and maleic anhydride are conventionally produced from petroleum through cracking process. These chemicals are highly demanded, with the current estimated revenue of nearly USD 100 ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Application of biochar produced from palm shells for the separation of crystal violet from aqueous solution by adsorption

Pages: 850–857

Preview Abstract

The present study investigates the application of biochar produced from palm shells using microwave heating technology for the removal of crystal violet from aqueous solution by adsorption. The effects of operating parameters such as initial pH, adsorbent ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of hydrothermal conditions on synthesis of na-zeolite from macroporous silica

Pages: 858–863

Preview Abstract

Na-zeolite was synthesized by hydrothermal/steam treatments on surface of macroporous silica, which was prepared from Si alkoxide and polyethylene glycol. Aqueous Al and Na sources and organic structure-directing agent was added prior to the treatments. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Understanding and modelling of gate adsorption behavior on metal-organic frameworks

Pages: 864–873

Preview Abstract

Flexible metal-organic frameworks (MOFs) show an adsorption-induced structural transition phenomenon called "gate adsorption", in which the host framework changes its structure at a specific adsorption pressure depending on a gas molecule, and therefore ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Molecular modeling of ordered mesoporous silica for understanding of capillary condensation

Pages: 874–880

Preview Abstract

We construct accurate atomistic silica pore models mimicking ordered mesoporous silica materials such as MCM-41 and SBA-15, which have atomic-level surface roughness and satisfy the electron density profile (EDP) of the ordered mesoporous silica ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of carbon nanotube (CNT) particle size on the performance of CNT/Polysulfone composite membranes during oil-water mixture Separation

Pages: 881–892

Preview Abstract

In this work, effect of carbon nanotube (CNT) particle size on the performance of carbon nanotube/polysulfone composite membranes during separation of oil-water mixture is reported. The CNT particle size CNT I: OD 6-9 nm x L 5 nm, and CNT II: D 110-170 nm ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Continuous flow chemical processing - sustainable manufacture of fine chemicals and polymers through process intensification in flow reactors

Pages: 893–899

Preview Abstract

In recent years, microreactor technology has transformed the way chemical synthesis is conducted in research laboratories by replacing batch reactions classically carried out in laboratory glassware, with continuous flow processes using tubular or chip ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Investigating the mineral carbonation of Mg and Ca-rich leachate for utilisation of Victorian brown coal fly ash

Pages: 900–910

Preview Abstract

Aqueous mineral carbonation of industrial waste (e.g. fly ash) is a potentially attractive sequestration technology to reduce CO2 emissions. Therefore, the carbonation capacity of solutions rich in Mg and Ca (similar to those found in suspensions of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Research on evaluation index system of coordination development among energy, economy, environment and ecology

Pages: 911–917

Preview Abstract

There are complicatedly interdependent and interactional relationships among Energy- Economy-Environment-

Ecology(4E) compound system, the coordinated development of 4E system is the final goal of sustainable social development. In this paper, on the basis ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Covalent surface modification of biomimetic silica particles

Pages: 918–928

Preview Abstract

Micron sized silica particles are commonly used as drug carriers, biosensors and catalytic supports. Functionalisation of their surfaces allows these particles to be specifically tailored for selective interactions, which may significantly enhance their ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Surfactant-free solid dispersion of water-insoluble substances in amorphous sugar matrix

Pages: 929–935

Preview Abstract

Solid dispersion techniques to disperse hydrophobic ingredients homogeneously in a watersoluble solid has been being continuously and extensively investigated in food and pharmaceutical fields. Herein, the following procedure, without using surfactant, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Preparing activated carbon with large specific surface area by chemical activation with nitrogen-K2CO3

Pages: 936–941

Preview Abstract

We tried to prepare an activated carbon with a large specific surface area from coal by chemical activation with nitrogen-K2CO3. The prepared activated carbon, which was mixed with nitrogen compound and K2CO3 at carbonization temperature 800?, had the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Synthesis of multi-period multiple utilities heat exchanger networks considering economics and environmental impact

Pages: 942–955

Preview Abstract

This paper presents a methodology for integrating various energy sources such as solar, wind, fossil fuel and biomass for energy generation into the synthesis of multi-period heat exchanger networks (HEN). The integration solution is imperative due to the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Direct measurements of interaction forces between proteins and metal surfaces by atomic force microscopy

Pages: 956–962

Preview Abstract

Adsorption of proteins on metal surfaces is important in various fields of engineering and science. Since the interaction between proteins and a solid surface is very complex, a fundamental understanding of the effects of proteins and metal surface ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Nanocrystalline cellulose from agro waste biomass: Production and characterization

Pages: 963–974

Preview Abstract

In this work, nanocrystalline cellulose (NCC) was produced from agro waste rice husk biomass by chemical extraction processes such as delignification, bleaching and hydrolysis. The production of NCC was carried out in a jacketed glass reactor under ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of microbial biomass presence on the adsorption of Cu, Cd and Zn by palm shell activated carbon

Pages: 975–980

Preview Abstract

Biomass of Bacillus subtilis and Aspergillus niger, respectively, was introduced to palm shell activated carbon (PSAC) served as support matrix and adsorption capacity of the obtained biosorbents to remove Cu(II), Cd(II) and Zn(II) ions from aqueous ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Hydrothermal pre-treatment of biomass waste for high surface area mesoporous activated carbons

Pages: 981–992

Preview Abstract

Preparation of mesoporous carbons and activated carbons has always been a resource-intensive process. When biomass is used as the raw material, an activating agent is typically mixed with the biomass and the mixture is activated by high temperature ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of pH value in preparation of Cu/ZnO catalysts for the low temperature methanol production from synthesis gas

Pages: 993–999

Preview Abstract

Methanol production from synthesis gas was investigated over a series of Cu/ZnO catalysts prepared by various pH conditions. In this work, liquid phase methanol production in low temperature was examined over a series of Cu/ZnO catalysts (Cu/ZnO, Cu/ZnO/...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Hybrid membrane with TiO2 based bio-catalytic nanoparticle suspension system for the degradation of carbamazepine

Pages: 1000–1008

Preview Abstract

Carbamazepine (CBZ) is one of the most recalcitrant pharmaceutically active compounds routinely detected in wastewater effluent-impacted environment. Bio-catalytic degradation with enzymes such as laccase provides a promising alternative for the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A new gas turbine cycle

Pages: 1009–1014

Preview Abstract

This paper describes a new gas turbine cycle which features pressure rise combustion. The cycle uses the hot turbine exhaust as a heat source to generate supercritical steam in a heat recovery steam generator at the highest temperature and pressure the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Dry separation using a gas-solid fluidized bed for mineral processing

Pages: 1015–1021

Preview Abstract

Run-of-mine ores are separated into valuable minerals and waste gangue by mineral processing to produce high grade minerals for industrial use. Generally, lump ore is treated by a float- sink separation known as dense medium separation, which is based on ...

ABSTRACT | PDF/EPUB

| 01 January 2015

Preview Abstract

The physical, electrical and acoustic properties of subsurface lithology are widely used in the identification and exact determination of the coal bed thickness and depth. Recently, Artificial Neural Networks (ANN) are widely being used in various ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Recovery of valuable elements from E-waste by chlorination

Pages: 1042–1049

Preview Abstract

To develop an efficient low-energy recovery process for such valuable elements from Ewastes, the dynamic behavior of ten elements was investigated during chlorination of samples prepared in three different ways: by incinerating and pyrolyzing the spent ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of mixing time on the performance of recombinant E.coli fermentations: Comparison of multi-compartment approach with CFD

Pages: 1050–1061

Preview Abstract

A reduction in yield of 7-20% due to non-homogenous substrate distribution at large scale is a known problem for industrial aerobic bioprocesses. Scale-down fermenters consisting of two or more compartments have been used to demonstrate that small areas ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Analysis of product quality by pH control and behaviors of organic impurities in the distillation and refining process of a bioethanol plant from waste wood

Pages: 1062–1065

Preview Abstract

The quality standard for the fuel ethanol for gasohol, JIS K2190, was established in 2011 in Japan. In the bioethanol production process the product should be highly purified because the fermentation broth contains a lot of impurities. In this study, the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Rate performance of electric double layer capacitor improved by mixing different active materials

Pages: 1066–1077

Preview Abstract

High-surface-area porous materials like activated carbon are employed as active material of electric double layer capacitor (EDLC). In charging and discharging an EDLC, ion migrates in the electrolyte solution in the pores inside the particles of active ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Electrochemical gasification of lignin dissolved in Alkaline water

Pages: 1078–1088

Preview Abstract

This study proposes electrolysis of alkaline water that has dissolved lignin (LG) that is often termed black liquor. This type of electrolysis, in other words, electrochemical gasification, consists of hydrogen formation at the cathode and

lignin ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Numerical simulation of a deformable cohesive packed bed

Pages: 1089–1096

Preview Abstract

Numerical simulation has proven to be important in understanding the behaviour of material within the ironmaking blast furnace and improving the efficiency and stability of the operations. However, a key feature of the blast furnace is the presence of the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Troubleshooting during plant commissioning

Pages: 1097–1107

Preview Abstract

Modern oil and gas processing plant comprise a complex arrangement of piping and equipment with many interfaces between the overall design and packaged equipment, as well as the commissioning and operations teams during design and start-up. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Process safety competency

Pages: 1108–1113

Preview Abstract

Knowledge and competency has been defined as one of the six pillars of process safety by the IChemE Safety Centre. It is fundamental to ensure that this competency is managed across an entire organisation, and not just focused on front line workers. There ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Lead process safety metrics

Pages: 1114–1119

Preview Abstract

Metrics have existed for many years across the occupational realm. In more recent times, there has been a focus on the use of metrics to monitor process safety. This has traditionally focused on lag metrics, as these are easier to monitor and analyse than ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Expansion behavior of binary solid-liquid fluidised bed with different solid mass ratio

Pages: 1121–1132

Preview Abstract

In the present study, experiments and computational fluid dynamics (CFD) simulations were performed to measure the expanded bed height of mono as well as binary solid-liquid fluidized bed (SLFB). A cylindrical acrylic Perspex column with an inner diameter ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Mechanochemical copolymerization of styrene and methyl methacrylate initiated by grinding quartz in an organic solvent

Pages: 1133–1137

Preview Abstract

Mechanochemical polymerization reactions depend on grinding to generate active centres such as radicals. Although organic-inorganic composites have been prepared by this method, the only organic solvent they have been synthesized in is n-heptane. In this ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Adsorbent concentration and adsorption time optimizations by using silica gel and synthetic Zeolit 3A on bioethanol levels of sorghum ('Sorghum bicolor L.')

Pages: 1138–1143

Preview Abstract

This study aims to determine the concentration of adsorbents and adsorption time optimization by using silica gel and synthetic zeolite 3A on bioethanol level of sorghum (Sorghum bicolor L.). The sorghum solution fermentation process is done by using a ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of radical scavenger on effluence of internal hydrophobic dyes from pluronic micelles using ultrasound

Pages: 1144–1149

Preview Abstract

In a general chemical industrial process, many reactors, mixture operations, and separation operations are needed, and the design and maintenance become complex. On the other hand, high performance drug carrier such as polymer micelles has been ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Temperature effects in adsorptive chromatography of polyphenols

Pages: 1150–1154

Preview Abstract

Temperature effects in adsorptive chromatography of polyphenols were analysed by using van't Hoff plots and isothermal titration calorimetry (ITC). The model polyphenols were catechin and epigallocatechin gallate (EGCG). The stationary phase (...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Catalytic cracking reaction of heavy oil using TiO2-ZrO2 catalysts under superheated steam conditions

Pages: 1155–1165

Preview Abstract

Upgrading of heavy oil was examined over titania-zirconia mixed oxide (TiO_2-ZrO_2) catalysts using fixed-bed flow-type reactors. Catalytic cracking of atmospheric residual oil (AR) into lighter fuels such as gas oil and VGO was carried out in superheated ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

CFD-DEM simulations for gas-solid flow in a fluidized bed

Pages: 1166–1173

Preview Abstract

The most recent method of simulating flow of mixture, couples the macroscopic governing equations for gas phase to the second law of motions for individual particles in the system. Though the method is more accurate than the continuum based description of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Pre-treatment of karanja biomass via torrefaction: Effect on syngas yield and char composition

Pages: 1174–1185

Preview Abstract

Torrefaction is a mild pyrolysis process that is carried out at relatively low temperatures. In the present study, torrefaction of karanja de-oiled seed cake was carried out in a bench-scale fixed bed reactor under inert (N2) atmosphere. Effects of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of sodium chloride on hydrothermal conversion of cellulose

Pages: 1186–1195

Preview Abstract

Hydrothermal conversion of cellulose produces solid material, which is to be used as fuel or functional material, and valuable chemicals as liquid products. Although various types of catalysts have been applied to this reaction, most of them suffer from ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Modeling of rheological behavior of oil-in-water emulsions

Pages: 1196–1207

Preview Abstract

Oil-in-water (o/w) emulsions are ubiquitous in the petroleum refining operations where the water and oil content of the emulsion varies largely. In the present study the rheological behavior of o/w emulsions is studied to investigate the effects of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Curcumin powders for pulmonary delivery by supercritical processing

Pages: 1208–1213

Preview Abstract

Micronised formulations for pulmonary delivery containing curcumin have been produced by supercritical antisolvent processing. The antioxidant curcumin was co-processed with hydroxypropylbeta- cyclodextrin (HP-beta-CD), and polyvinylpyrrolidone (PVP) to ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Development of photocatalytic microreactor with separated oxidation/reduction channels

Pages: 1214–1217

Preview Abstract

A novel photocatalytic microreactor was developed, which was comprised of two stacked channels divided by a TiO2/metal bi-layered plate. Under the light irradiation to the TiO2 coated channel, the holes cause the oxidation in the irradiated channel, and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Lipid oxidation of goat milk infant formula

Pages: 1218–1228

Preview Abstract

The depletion of headspace oxygen concentration and the formation of hexanal via lipid oxidation of milk powder was measured by static headspace gas chromatography. Milk powder oxidation experiments were conducted under accelerated storage test conditions ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Synthesis of single-walled carbon nanohorn dispersed with magnetite nanoparticles via gas-injected arc-in-water method and application to biodiesel production catalyst

Pages: 1229–1235

Preview Abstract

Single-walled carbon nanohorn (CNH) is one of carbon nanotube family materials, and CNH can be synthesized by a method using a submerged arc plasma in water, called gas-injected arc-inwater (GI-AIW) method. GI-AIW method enables ones to obtain CNH ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Location based performance of solar assisted natural gas combined cycle

Pages: 1236–1243

Preview Abstract

The performance of solar assisted gas turbine power plants are analysed to determine the trade offs between economics and possible carbon dioxide emission reduction. Economic performance, in the form of net present value, is compared against the CO_2 ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Application of CFD modelling to determine the impeller critical suspension speed in stirred tanks: A CFD modelling based approach to determining the just suspended speed in mechanically stirred tanks

Pages: 1244–1257

Preview Abstract

For efficient solids suspension in stirred tanks, it is important to know the just-suspended impeller speed, Njs. Correlations for Njs have been developed, but these have significant limitations. An alternative means of estimating Njs may be through CFD ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Pelletisation of koi carp meal

Pages: 1258–1265

Preview Abstract

Koi carp is an invasive pest fish prolific in the Waikato waterways first introduced in the 1970's, that reproduces rapidly, decreases water quality by stirring up sediment, and competes with native fish for food. At Lake Waikere, the Waikato Regional ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Support vector machine based fault detection using dissipativity features

Pages: 1266–1274

Preview Abstract

In this paper, the dissipativity theory is used to extract process properties from input output data. The dissipativity properties of a system may be viewed as an 'abstract energy property' of the system. Faults in the systems would change the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Designing an ecological sustainable energy system for industries involving multiple decision makers

Pages: 1275–1287

Preview Abstract

In reference to sustainable development, an eco-industrial park (EIP) has great potential in enhancing socioeconomic performance of a nation. This is done by lowering harmful emission and wastes to improve environmental performance, increase profitability ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Influence of calcium on struvite crystallization

Pages: 1288–1294

Preview Abstract

Struvite recovery has drawn great interest in recent years because of the phosphorus recovery potential. This technique does not currently have many applications because of the variation in product purity. Foreign ions in the wastewater are one of the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

High permeance composite hollow fiber membranes for CO2 capture from flue gas

Pages: 1295–1299

Preview Abstract

Compared to the conventional technologies such as amine absorption for CO2 capture from industrial sources such as flue gas, membrane separation process has unique advantages of being environmentally benign, lower maintenance and smaller footprint. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Optimisation of solar powered membrane distillation system using CFD and TRNSYS coupled model

Pages: 1300–1309

Preview Abstract

Membrane distillation (MD) is a thermal driven separation process for water recovery from saline waste streams. MD operates at relatively low temperature, which enables the utilization of low graded heat generated by solar thermal collectors. However, due ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

The injection of Victorian brown coal in ironmaking blast furnace: Model development and evaluation

Pages: 1310–1320

Preview Abstract

In this paper, a three-dimensional mathematical model is developed to simulate the flow and thermochemical behaviours of injecting Victorian brown coal at the lower part of an ironmaking blast furnace (BF). The model geometry covers the regions of lance, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Enzymatic pre-treatment of Palm Oil Mill Effluent (POME) for enhanced anaerobic digestion

Pages: 1321–1331

Preview Abstract

The production of highly polluting palm oil mill effluent (POME) has resulted in serious environmental hazards. Anaerobic digestion (commonly adopted for POME treatment) alone is insufficient to attain regulatory discharge limits due to the high ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Floating pressure control in an extractive divided wall column

Pages: 1332–1341

Preview Abstract

In an extractive dividing wall column (EDWC) design, the additional degree of freedom, vapour split ratio, affects the energy consumption required for separation significantly. However, as the location of the wall partition is physically fixed, the vapour ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Analysis of severe acidic degradation resulted by incompatibility of polystyrene and polyethylene

Pages: 1342–1352

Preview Abstract

This paper is targeting to investigate the properties when recycling of polystyrene (PS) has unexpectedly mixed with high density polyethylene (HDPE). When the mixing PS/HDPE happens, the performance of the polystyrene tends to drop tremendously due to ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Influence of mass transfer on the electrochemical reduction of CO2 on polycrystalline copper in KHCO3 medium

Pages: 1353–1359

Preview Abstract

The electrochemical reduction of CO2 is part of the ambitious, but not impossible, carbonneutral cycle that incorporates CO2 as the carbon source for the production of high density fuels. To date, research has demonstrated

that copper based ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Cryogenic liquefied air energy storage: A study on cold storage

Pages: 1360–1369

Preview Abstract

Renewable energy has been gaining popularity to replace fossil fuels as an energy source but it is often generated at off-peak and in locations away from the demand. Therefore the development of energy storage systems is important. Recently, liquefied air ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Direct purification of hepatitis B core antigen Y132A dimer using packed bed anion exchange chromatography

Pages: 1370–1376

Preview Abstract

Hepatitis B core antigen (HBcAg) with the mutation of Y132A (HBcAg-Y132A) has been successfully expressed in Escherichia coli. The mutant HBcAg-Y132A is unable to self-assemble into a virus-like particle (VLP). It has a potential to be employed in ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Multiple-objective financial management using pinch analysis

Pages: 1377–1386

Preview Abstract

Global business competitiveness and the increasing environmental regulations have made the manufacturing company to look for cost effective measures to conserve energy resources so as to reduce its total carbon emission. Over the past decades, pinch ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Oxidative chemical vapor deposition: A novel, solvent-free and conformal conductive polymer coating of Li1.2Mn0.54Co0.13Ni0.13O2 cathode materials for secondary lithium-ion batteries

Pages: 1387–1393

Preview Abstract

A novel in situ one-step polymerization and coating technique, oxidative chemical vapor deposition method (oCVD), has been developed for the conductive polymer coating of lithium-ion battery materials for the first time. Poly(3,4-ethylenedioxythiophene) (...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

High-capacity sulfur dioxide trap materials based on manganese dioxide at low temperature in diesel exhaust

Pages: 1394–1401

Preview Abstract

The emission of nitric oxides (NOx) from diesel exhaust is one of the main air pollutants, and the activity of NOx removal catalysts are deactivated by sulfur oxides (SOx) in diesel exhaust. One suggested way to improve the longevity of NOx removal ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

3D visualisation of a dynamic pore network structure using X-ray microtomography

Pages: 1402–1408

Preview Abstract

In a heap leach process, the pore network structure of the agglomerated mineral particles is a critical determinant of efficient lixiviant flow. During the leaching period, a degree of slumping can occur due to a weakening of the heap, changing the ...

ABSTRACT | PDF/EPUB

| 01 January 2015

Modifying the strength and stability of nickel laterite pellets

Page: 1409

PDF/EPUB

| Conference Paper | 01 January 2015

Loss of primary containment: A structured LOPC control framework in managing process safety hydrocarbon leakages

Pages: 1410–1417

Preview Abstract

A complex hydrocarbon processing facilities leads to a more complex Mechanical Integrity (MI) issues. A structured control framework is required to manage the integrity and reliability of the assets to ensure all fluids are contained within the primary ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Sustainable conversion of lignocellulosic biomass into reducing sugars using alkaline pre-treatment

Pages: 1418–1427

Preview Abstract

At present, a huge amount of lignocellulosic biomass is generated as a by-product worldwide. Lignocellulosic biomass represents a renewable source of fermentable sugars for significant industrial use. Hence, the conversion of this resource to second-...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Using dilute acid hydrolysis pre-treatment in transforming lignocellulosic biomass into reducing sugars: A review

Pages: 1428–1438

Preview Abstract

Currently, lignocellulosic biomass is generated as a by-product globally in a significant amount. Underutilization of this renewable resource is unsustainable from both environmental and energy aspects. Thus, biotechnological conversions of this ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A general approach to universal wearable piezoresistive sensors based on liquid wetting

Pages: 1439–1442

Preview Abstract

Stretchable conductors are a new class of advanced materials that simultaneously exhibit great electrical performance and excellent mechanical robustness. Generally, rigid metals/semiconductors are used to transport electrical signal while soft polymeric ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of vibration and air temperature on the performance of Proton Exchange Membrane Fuel Cell (PEMFC)

Pages: 1443–1450

Preview Abstract

The use of fossil fuels in transportation produces toxic gas which will damage the environment. Fuel cell is an electrochemical device that directly converts the chemical energy into electricity with water as by-product. Proton Exchange Membrane Fuel Cell ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Application of hybrid pid-anfis controller for post combustion CO2 capture process

Pages: 1451–1461

Preview Abstract

Solvent-based post combustion carbon dioxide capture (PCC) technology has received a lot of attention due to its operational flexibility and cost-effectiveness in reducing CO_2 emission from power plants. In this study, a hybrid PID-ANFIS is developed for ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

The flow behaviour of sludge mixtures: Impact of volume fraction at similar total solids concentration

Pages: 1462–1468

Preview Abstract

Different types of sludge (primary, secondary and digested) undergo mixing throughout the waste water treatment process. As such, its flow behaviour prior to and after mixing is altered dramatically. Although the flow behaviour of activated and digested ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Development of liquid-liquid extraction process by using large capacity micro-channel reactor (SMCR)

Pages: 1469–1475

Preview Abstract

A new type of large capacity micro-channel reactor called the Stacked Multi Channel Reactor (SMCR) was developed. SMCR enables having a larger capacity by increasing the number of channel, which is one of the method to increase the capacity of reactor and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Agglomeration of Ni-rich hydroxide in Conical Taylor Vortex flow

Pages: 1476–1486

Preview Abstract

As a precursor of the cathode material for Li-ion battery is presented in this study the Ni-rich hydroxide. One of the most critical factors determining the electrical capacity of the cathode is the tap density which depends on a spherical shape and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Dissolution and post leach characterisation of synthetic betafite - a uranium pyrochlore mineral

Pages: 1487–1497

Preview Abstract

Over recent years there has been an increasing interest in refractory uranium minerals as a potential source of uranium to keep up with the growing demand for nuclear fuel. One mineral of particular interest is the pyrochlore betafite: [(Ca,U)2(Ti,Nb,Ta)...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Measuring turbulence in a flotation cell using Electrical Resistance Tomography

Pages: 1498–1509

Preview Abstract

Measuring turbulence in an industrial flotation environment has long been problematic due to the opaque, aggressive and abrasive three-phase environment in a flotation cell. One of the promising measurement techniques is Electrical Resistance Tomography (...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Maximizing power efficiency in gas-solid-liquid stirred vessels handling high solids concentrations

Pages: 1510–1521

Preview Abstract

This study focuses on determining the optimum operating and geometrical conditions that will enhance the agitator energy efficiency in a gas-liquid-solid agitated vessel. A term defined as the power efficiency factor (epsilon jsg -1 (kg/W)) served as an ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Hyper-spectral imaging for the discrimination of milk powder

Pages: 1522–1533

Preview Abstract

Hyper-spectral imaging (HSI) is an emerging, hybrid process analytical technology, combining imaging and spectroscopic techniques for food quality monitoring and assessment. While this technique has recently proved popular for food quality assessment in ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Development of Polyvinyldene Floride (PVDF)/Graphene Oxide (GO) membrane for oily waste water filtration: A performance study

Pages: 1534–1545

Preview Abstract

Polyvinyldene floride (PVDF)/ graphene oxide (GO) membrane was developed for oily waste water filtration purposes at different pH. Incorporation of GO at 2wt% loading was found to decrease the overall crystallinity of the membrane as indicated by ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Production of lignin resin material from lignocellulosic biomass combining acidic saccharification and acetone treatment

Pages: 1546–1552

Preview Abstract

The structure of lignin, which is one of the main components of lignocellulosic biomass, is basically formed by the cross-linking of phenolic compounds. Taking the advantage of this structural property, the conversion method of lignin to resin material ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Synthesis, optimisation and characterisation of thermoresponsive polymer brushes

Pages: 1553–1564

Preview Abstract

The use of polymer brushes, terminally grafted polymer films, is a common method for modifying interfacial properties on range of substrates. The use of stimulus-responsive monomers allows the formation of brushes that change their conformation and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Implementation of Problem-Based Learning (PBL) in chemical thermodynamics course at the Yanbu Industrial College, Saudi Arabia

Pages: 1565–1572

Preview Abstract

This work is focused on the strategies used to effectively incorporate PBL in chemical thermodynamics course being taught at the chemical engineering technology department at the Yanbu Industrial College, Saudi Arabia. The course was redesigned to map ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Economising biodiesel production process through value-added utilisation of crude glycerol

Pages: 1573–1584

Preview Abstract

In recent years, there has been an increasing interest in biofuels, such as biodiesel, because they have great potential to replace conventional petro-based fuels and consecutively reducing their negative environmental impact. However, a major problem ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Scaffolding positive student experiences via flexible, sustainable design of course curriculum with embedded new technologies

Pages: 1585–1588

Preview Abstract

Meaningful student engagement must be efficient in delivery for students and be structured in such a way as to ensure academic rigor and high quality outcomes for students while also being sustainable in terms of cost and time involved.

 In ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Two-stage butanol fermentation in a batch oscillatory baffled bioreactor with 'in situ' product recovery via gas stripping

Pages: 1589–1595

Preview Abstract

One way to improve the acetone, butanol and ethanol (ABE) yield and productivity is through intensification of the fermentation process. In this work, a novel bioreactor called the oscillatory baffled bioreactor (OBB) was evaluated for this process. This ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Fabrication of nanostructured TiO2/Ti bi-layered plate and its application to photocatalytic microreactor

Pages: 1596–1599

Preview Abstract

Nanostructured TiO2/Ti bi-layered plates were prepared by the alkaline treatment of Ti plate, followed by the acid treatment and thermal treatment. TiO2 with fiber- or flake-like nanostructure was formed on Ti plate, depending on the conditions of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Degradation of 1,4-dioxane by the electro-fenton process

Pages: 1600–1606

Preview Abstract

Fenton oxidation, which utilizes hydroxyl radical generated by Fenton reaction, is well known as an efficient process for degrading organic pollutants in wastewaters. A large amount of ferrous irons is, however, dosed in many cases, generating much iron ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Adsorption and desorption properties of the PtRu nanoparticle catalysts deposited on the different supports

Pages: 1607–1611

Preview Abstract

Some of the authors have recently reported that PtRu nanoparticles deposited on TiO2 embedded carbon nanofiber support (PtRu/TECNF) show an ultrahigh catalytic activity for methanol oxidation for a direct methanol fuel cell (DMFC). The increased catalytic ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Filtration rate of a sea squirt ('Ciona savigny')

Pages: 1612–1617

Preview Abstract

This study was carried out to estimate a filtration rate of a sea squirt (Ciona savignyi) in consideration of effects of length of its body and temperature. The filtration rate, F [L/h], was expressed by a function of body length, L [cm], as

follows: F = ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A study on non-thermal effect of microwave through molecular orbital method and in-situ observation of bubble formation

Pages: 1618–1622

Preview Abstract

Non-thermal effect of microwave on water has been a subject of interest, however, its mechanism is not well understood. This study, therefore, aims to report the experimental and simulation investigations on the effect of microwave on water. Particularly, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Mass transfer characterization of aluminum carboxymethyl cellulose membrane involved in cross-linking reaction

Pages: 1623–1634

Preview Abstract

Superior molecular size screening and mass transfer flux of aluminum cross-linked carboxymethyl cellulose (CMC) membrane were demonstrated. The effect of cross-linking time by aluminum cation on membrane characteristics was examined. Over a cross-linking ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Enhancement by ultrasound irradiation on enzymatic production of biodiesel in one part of a two-compartment reactor

Pages: 1635–1641

Preview Abstract

Enzymatic production of biodiesel was successfully performed by ultrasound irradiation in one part of a two-compartment reactor. Ultrasound-assisted enzymatic transesterification for producing fatty acid methyl ester (FAME) from rapeseed oil was carried ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Cell-surface engineering of 'Halomonas elongata' as an element recycling biotechnology in high salinity environments

Pages: 1642–1652

Preview Abstract

High salinity and metal pollution are often observed together because inorganic metals and mineral salts are concentrated simultaneously in nature. Therefore, the key to successful metalbioremediation and element-recycling is to develop metal-...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Dynamic risk assessment using alarm data

Pages: 1653–1664

Preview Abstract

Abnormal situations can lead to plant shut-down or run-away conditions leading to hazardous incidents if safety systems fail to mitigate serious process abnormality. In order to design and operate a chemical process with reduced incident and accident ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A continuum simulation model for the Reflux classifier

Pages: 1665–1675

Preview Abstract

A 2-D model for continuous processing has been developed to study the segregation and dispersion of multicomponent systems in the Reflux Classifier (RC). The fluidized and inclined sections in the RC were divided into different shells and elements in the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Biocompatible production of fatty acids by immobilized lipase in supercritical carbon dioxide toward industrial process design

Pages: 1688–1698

Preview Abstract

Biocompatible production of fatty acids using immobilized lipase in supercritical carbon dioxide (SCCO2) was designed for industrial processes. The advantages of biocompatible production with enzymatic reaction using SCCO2 are its nontoxicity for human ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Comparison of facile synthesis routes for hydrophobic silica particles

Pages: 1699–1710

Preview Abstract

The use of silica particles in industrial applications has dramatically increased in the last decade due to the versatility of the fabrication process to design particles for specific applications including catalysis, coatings and separation materials. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Towards processing waste green plant materials: A sustainable source of leaf proteins, raw biological materials and biochemical products

Pages: 1711–1719

Preview Abstract

Waste green plant materials (WGPMs), such as lawn clippings, garden waste and paunch grass are negative-value materials with potential value-added applications. This study investigates the potential use of WGPMs in a high-yield protein recovery process to ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A systematic multi-objective methodology for optimal mixture design in integrated biorefineries

Pages: 1720–1731

Preview Abstract

An integrated biorefinery is a processing facility that integrates biomass conversion pathways to produce value-added products. To date, various conversion pathways are available to convert biomass into numerous chemical products. Hence, a systematic ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Cellulose aerogels from paper waste for excellent oil spill cleaning and heat insulation

Pages: 1732–1740

Preview Abstract

A facile and cost-effective synthesis method of biocompatible cellulose aerogels using recycled cellulose fibres of paper waste and Kymene cross-linker is successfully developed. The developed cellulose aerogels are non-toxic, ultra-lightweight but strong,...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Prediction of the tablet hardness: Exploration of microcrystalline cellulose and scale-up in wet granulation

Pages: 1741–1752

Preview Abstract

Tablets display a fine balance of strength and fragility: being strong enough to handle but fragile enough to disintegrate and effectively deliver the active ingredient. Therefore the final tablet strength relies on the formulation and the manufacturing ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Evaluation of the economic and environmental impacts of CO2 treatments from the coal-fired power plant through methanol production

Pages: 1753–1758

Preview Abstract

Minimizing CO2 emission in the atmosphere to prevent the climate change has required more efforts to capture and utilize CO2. One viable solution is to recover and store CO2 underground through capture processes. However, the cost to capture CO2 is still ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Starting torque and flow dynamics of vertical paddle impellers

Pages: 1759–1766

Preview Abstract

When rotation of an impeller is started, the torque is larger than that at a steady state. This torque is important for the design of the impeller. However, the relationship between the starting torque and the rotational speed and the shape of the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

In situ modifications of bacterial cellulose film with 'Pandanus amaryllifolius' extract for heavy metal removal

Pages: 1767–1773

Preview Abstract

Bacterial cellulose is a biopolymer from fermentation with high hydrophilicity and mechanical strength. These properties bring opportunities in many fields in the form of paper, film and membrane. The morphology and properties of bacterial cellulose can ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Application of 'Moringa oleifera' seeds and 'Musa cavendish' as coagulants for lead, nickel and cadmium removal from drinking water

Pages: 1774–1781

Preview Abstract

Contamination of drinking water sources by heavy metals in many South Asian countries has become a major public health concern. As conventional chemical treatment of the contaminated water may not be feasible for many remote communities in the region due ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Corrosion resistance of Al-Mg alloy 5052 in chloride containing neutral cooling water

Pages: 1782–1789

Preview Abstract

Al-Mg alloy 5052 is commonly used as construction material of nuclear reactor components due to its low neutron flux and high corrosion resistance in demineralized water. This research is directed to identify the corrosion resistance of Al-Mg alloy 5052 ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Microreactor flow synthesis of ZIF-8 particles with controlled size, shape and adsorption properties

Pages: 1790–1793

Preview Abstract

Zeolitic imidazolate framework-8 (ZIF-8), which is a family of metal organic frameworks, is a new porous material with high porosity and surface area, and it consists of zinc ions and 2- methylimidazole (2-MeIM) linkers. ZIF-8 shows unique adsorption ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Study on reaction mechanism of benzene oxidation by using metal complex catalysts

Pages: 1794–1802

Preview Abstract

Vanadium and copper complex catalysts have a promising potential for the selective hydroxylation of benzene to phenol and hydroquinone, which are important intermediates in chemical industries. Though phenol is mainly manufactured using the cumene process,...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Tuning the surface charge via protonation of graphitic carbon nitride (g-C3N4) coupled with reduced graphene oxide (rGO) as 2D/2D heterojunction nanocomposites toward artificial photosynthesis

Pages: 1803–1814

Preview Abstract

In view of the substantial rise in CO2 and the concern about energy supply, the conversion of CO2 into renewable fuels by artificial photosynthesis has been regarded as one of the most compelling strategies to circumvent energy and environmental problems. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Experimental investigation on the improvement of adsorption rate in silica-gel layer by carbon fiber doping

Pages: 1815–1824

Preview Abstract

Desiccant air conditioning process by heat exchanger with adsorbent driven with waste heat has a potential to be a highly efficient because latent and sensible heat can be controlled independently. But, mass and heat transfer phenomena occurred in the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A study of fine coal flotation using a cyclic alcohol frother

Pages: 1825–1833

Preview Abstract

Raw coal is typically subjected to beneficiation processes to remove mineral matter before being sold to market. The coal industry wants to improve combustible recovery, reduce beneficiation unit costs, and attain efficiency optimization, especially for ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A standalone operator training simulator for biodiesel production from waste cooking oil

Pages: 1834–1843

Preview Abstract

Due to the limited availability of non-renewable energy sources and the environmental concerns, biodiesel is seen as an alternative fuel in the future. Using waste cooking oil (WCO) enables cost effective biodiesel production and also facilitates ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

CFD-DEM simulation of binary systems of particles in liquid fluidised beds: Segregation and dispersion

Pages: 1844–1853

Preview Abstract

Solid liquid fluidised beds (SLFB) are widely used in industrial processes, where solid particles of different sizes and densities are often encountered. The differences in the physical properties of particles could lead to a partial or complete ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Analysis of interaction forces for predicting the transition from segregation to mixing of binary solids in a miniaturised gas fluidised bed

Pages: 1854–1865

Preview Abstract

Gas-solid fluidised beds are widely used in chemical, petrochemical, pharmaceutical, biochemical and powder industries. Particles used in gas-solid fluidised beds often differ in size and/or density, thus have the tendency to segregate under certain ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of oxidized surface of tennantite and chalcopyrite on Diethyl Dithiophosphate (DTP) adsorption and the kinetics; observed using UV-Vis Spectroscopy

Pages: 1866–1872

Preview Abstract

In order to be able to predict the effect of oxidized surface of both tennantite and chalcopyrite on Diethyl Dithiophosphate (DTP) adsorption, UV-Vis Spectroscopy analysis was utilized to quantify the concentration changes of DTP. Oxygen was used to ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Comparative study of non-noble metal catalysts supported on alumina for lactic acid production via glycerol hydrogenolysis

Pages: 1873–1874

Preview Abstract

The catalytic activity for lactic acid production from glycerol was investigated over Ni, Co, Cu and Fe supported on γ-Al2O3. With an excess of sodium hydroxide and water, Ni/Al2O3 catalyst showed the highest activity for lactic acid production in ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Can BAC treatment mitigate microfiltration membrane fouling in wastewater reclamation over the long term?

Pages: 1875–1882

Preview Abstract

Biologically treated secondary effluent (BTSE) is a good target for water reclamation as municipal wastewater

provides a continuous source. The application of microfiltration for the reclamation of wastewater has increased greatly over recent years. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Platinum supported on H-Mordenite: A highly efficient catalyst for selective hydrogenolysis of glycerol to 1,3-PDO

Pages: 1883–1895

Preview Abstract

The selective production of 1,3-propanediol from glycerol under mild reaction conditions is of high interest. The current work describes the use of a highly selective catalyst consisting of platinum supported on mordenite zeolite employed for the first ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Utilization of response surface methodology analysis on the degradation of diisopropanolamine by Fenton's reagents

Pages: 1896–1903

Preview Abstract

Fenton's oxidation uses hydrogen peroxide and ferrous ion to produce hydroxyl radicals and its efficiency depends on the concentrations of these two reagents. The objective of this research was to understand the effects of these reagents on the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Experimental study of the impacts of pH and aeration on kinetics of ethanol fermentation using

cassava and fruit waste

Pages: 1905–1915

Preview Abstract

Bioethanol has been recognized as an important renewable and environmental friendly fuel. The conventional ethanol fermentation production, such as, from sugar- and starch-based crops will over the long-term compete with food consumption. The use of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Process intensification for energy saving of enrichment and dehydration processes of biofuel ethanol production

Pages: 1916–1924

Preview Abstract

A fermented mash liquid (3,000 kg/h, 5 wt% ethanol) is firstly enriched up to near-azeotropic point by using a compressor-free HIDiC (Heat Integrated Distillation Column) system developed by our NEDO project. This system consists of a mash column followed ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Production of biochar from biomass residue for household cooking

Pages: 1925–1928

Preview Abstract

60% of the urban and 99% of the rural households use biomass for cooking in Bangladesh. Biomass residue collected from the vicinity of the houses (e.g. dead leaves, small tree branches and twigs) is frequently used in cooking. In addition, agricultural ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Electrochemical characterization and comparison of three bromine-sequestering agents for zinc/bromine flow battery applications

Pages: 1929–1940

Preview Abstract

Three different bromine-sequestering agents (BSAs) were proposed and assessed for their fitness-for-utilization in zinc-bromine redox flow batteries (Zn/Br RFBs). These BSAs included the bromide salts of the following cations: 1-ethyl-1-methylpiperidinium ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Natural Rubber (NR) latex epoxidation reaction using Oscillatory Baffled Reactor (OBR)

Pages: 1941–1949

Preview Abstract

Currently, the Epoxidised Natural Rubber (ENR) reaction process is conducted in batch manner with total reaction time of approximately 22-24 hours. This limits the production capability to increase the volume productivity for ENR to support various ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Is it possible to produce biochar at different highest treatment temperatures in the pyrolysis range? - The exothermic nature of pyrolysis

Pages: 1950–1957

Preview Abstract

Biochar, charcoal applied to soil, has been proposed as a means to sequester carbon and concurrently improve soil properties. Typically, it is produced in the temperature range 300 to 700 degreesC. Lower temperatures are desired to favour biochar-soil ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Photocatalysis in a packed bed: Degradation of organic dyes by immobilized silver nanoparticles

Pages: 1958–1966

Preview Abstract

Complete photocatalytic degradation of organic dyes in wastewater was accomplished using immobilized silver nanoparticles as catalysts and tethered calix[7]hydroquinone molecules as nanoreactors. The nanoparticles were immobilized on quartz beads that ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of steam/carbon ratio on the compact auto-thermal reformer

Pages: 1968–1977

Preview Abstract

Performance of self-sustaining methanol auto-thermal reforming (ATR) was investigated experimentally to elucidate a reforming reaction mechanism and a condition required for high purity H2 production. The compact reformer consists of vaporizing and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Mathematical modelling of flow and heat transfer in COREX process by CFDDEM method: The effect of a novel burden profile

Pages: 1978–1988

Preview Abstract

Iron for steel production is produced mainly in a conventional blast furnace (BF). New ironmaking processes have been introduced in the last two decades because of environmental concerns to reduce CO2 emission. One such process is COREX, which can operate,...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Impact of pretreatment on supercritical carbon dioxide extraction from dried parsley ('Petroselinum crispum L.') leaves

Pages: 1989–1993

Preview Abstract

The effect of pretreatment on the extraction of bioactive components apigenin from dried parsley ('Petroselinum crispum L.') leaves using supercritical carbon dioxide (SCCO2) was examined. Apigenin is a bioactive ingredient found in many vegetables and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Optimization of silver nanoparticles formation using de-oiled 'Saccharina Japonica' waste by employing response surface methodology: Green synthesis

Pages: 1994–2005

Preview Abstract

The aim of this work was to obtain uniform and well-dispersed spherical silver nanoparticles using statistical design of experiment. For the purpose, we have performed the experiments based on the statistical design regarding to optimize the process ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Coil-stretch Hysteresis of polymer solutions at finite concentrations

Pages: 2006–2013

Preview Abstract

Nearly 40 years ago, de Gennes predicted that polymer solutions could have different states of stress at the same strain rate, if their deformation histories were different. This phenomenon of "Coil-stretch hysteresis", has been investigated largely in ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Droplet-based microreactor system for an efficient recovery of rare metal ions with calix[4]arene derivatives from acidic media

Pages: 2014–2019

Preview Abstract

Precious metals are important rare metals for advanced materials. The supply, however, has been inconsistent due to

poor natural abundance. Recycling from spent home appliances i.e. urban mine is complicated as it contains several other metals. Therefore, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Characteristic behaviours and trends of powders from different Geldart groups in a rotating drum

Pages: 2020–2029

Preview Abstract

When a horizontal cylinder is partly filled with a particulate solid and the drum rotated, the solids respond with patterns of movement that are largely determined by mean particle size, particle density, shape, fill level in the drum and rotation rate. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Dynamic simulation of adiabatic packed bed tubular reactor for WGSR under cascade temperature control strategies - effect of secondary temperature measurement location

Pages: 2030–2041

Preview Abstract

High-temperature Water Gas-Shift Reaction (WGSR) is a well-known chemical route to produce hydrogen (H2) from waste carbon monoxide (CO). The WGSR in an adiabatic packed bed tubular reactor (PBTR) is often vulnerable to catalyst degeneration due to high ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Decomposition behavior of liquefied sewage sludge in supercritical water

Pages: 2042–2051

Preview Abstract

In this work, a fundamental study on the decomposition behavior of liquefied sewage sludge in supercritical water was considered. From gasification experiments using batch reactors, both gas production and efficiencies were in no way inferior to those ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

CFD simulation of thorium extraction in membrane contactors

Pages: 2052–2058

Preview Abstract

The extraction of thorium from aqueous solutions in membrane contactors was investigated theoretically. Extraction of Th (IV) using solution containing kerosene and tri-butyl phosphate (TBP) was studied. A new approach based on momentum and mass transfer ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Diffraction science under process conditions - an overview

Pages: 2059–2072

Preview Abstract

Powder diffraction is the most broadly applicable way of analysing a crystalline sample for the identification of the phases present, and their compositional variation, microstructure and abundance. Such data may be collected dynamically in a range of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Influence of heating method on size and morphology of metallic oxide powder synthesized from metallic nitrate solution

Pages: 2073–2080

Preview Abstract

This study clarified the influence of de-nitration process heating conditions on particle morphology and size. Copper oxide synthesized by heating de-nitration was used as a model for the de-nitration process of a mixture of plutonium nitrate and uranyl ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Investigation of polymeric nuclei and their role in biomimetic silication: Effect of physical conditions

Pages: 2081–2092

Preview Abstract

Silica particles can be synthesized via condensation polymerization of a hydrolysed silica source such as trimethoxymethylsilane (TMOMS). Biomimetic silica particles are formed by using polyamines, such as

polyethyleneimine (PEI). Negatively charged ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Coagulation-flocculation treatment of brewery wastewater using cationic seed gum from 'Cassia obtusifolia'

Pages: 2094–2100

Preview Abstract

In recent studies, most conventional inorganic coagulants have shown to be toxic to aquatic environments in the long run. In this study, cationic seed gum extracted from the seeds of Cassia obtusifolia was assessed for its potential as an alternative ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Inducing Crystallinity of engineered size pharmaceutical particles in a single step of spray drying

Pages: 2101–2104

Preview Abstract

Spray drying is one of the main technologies used in the food and pharmaceutical industry for generation of powder from liquid feed in a single step. This paper aims to assess the benefit of a counter current form of spray drying, which is less widely ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Safety shares in the class room 2

Pages: 2105–2114

Preview Abstract

Within many Australian industries every meeting, no matter what the topic, begins with a safety share, safety moment or toolbox talk. This practice has been replicated in two subjects in the chemical engineering programs at the University of Melbourne by ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Liquid membrane extraction of metals: Overall mass transfer coefficient

Pages: 2115–2124

Preview Abstract

Extraction of metals using membrane-based solvent extraction processes offers many advantages over conventional technology. Hollow-fibre contactors have demonstrated great potential in large-scale application of this concept in extracting and recovering ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

'Surrogate-assisted' optimisation of Pressure Swing Adsorption (PSA) process

Pages: 2125–2136

Preview Abstract

Pressure Swing Adsorption (PSA) typically involves multiple fixed beds operating in a cyclic manner. The beds in the PSA process operate in a dynamic fashion, with each one of them undergoing a sequence of steps, which constitute a "cycle". However, the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Comparative evaluation of hydroxyl (HO) and sulfate (SO4-) radical based advanced oxidation process for bisphenol a degradation

Pages: 2137–2148

Preview Abstract

Bisphenol A (BPA) is an industrial chemical and a suspected endocrine disrupting chemical (EDC). It finds its way to water bodies through production units and by leaching from the end products made by BPA-based resins (epoxy and polycarbonate). In the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Influence of the fluid shear rate on the breakage of magnetic particle chains

Pages: 2149–2156

Preview Abstract

The objective of this work was to understand the micromechanical deformation and breakage of magnetic particle chains under shear stresses. An investigation into the effect of varying fluid shear rates on the magnetic strength of linear magnetic particle ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of shear flow on the coarse particle detachment from the bubble surface

Pages: 2157–2164

Preview Abstract

Detachment of particles from the bubble surface plays an important role in the efficiency of flotation separation of coarse hydrophobic particles from hydrophilic ones in water using air bubbles. The literature indicates that coarse

particle flotation ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Comparing yields from the extraction of different citrus peels and spray drying of the extracts

Pages: 2165–2173

Preview Abstract

In this work, a comparison between the quality and quantity of natural antioxidant powders produced from combined extraction and spray drying of various citrus peels has been performed. The average total phenolic contents (TPC) of all citrus (orange, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Sewage sludge dewatering properties for predicting performance of industrial thickeners, centrifuges and filters

Pages: 2174–2185

Preview Abstract

Solid-liquid separation involving suspensions is important in a large range of industrial applications, including mineral processing and wastewater treatment and disposal. The development of theoretical descriptions of solid-liquid separation, or ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Carbon dioxide reforming of biomass tar using recycled material as catalyst supports

Pages: 2186–2194

Preview Abstract

Pyrolysis and gasification are robust thermochemical conversion technologies for transforming biomass into bio-char and renewable energy. However, tars (heavy organic compounds present in the syngas) produced from these conversion processes are ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Dewatering studies of Ni laterite using Superabsorbent polymers

Pages: 2195–2206

Preview Abstract

High rate of sedimentation, supernatant clarity and compact consolidation of slurries are the main requirements for effective dewatering methods of valuable minerals such as nickel (Ni) and cobalt (Co). The current conventional dewatering methods such as ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Influence of pulp chemistry on particle interactions, and dewatering behaviour of laterite dispersions

Pages: 2207–2217

Preview Abstract

Lateritic ores are the key source of valuable metals such as nickel (Ni) and cobalt (Co). Hydrometallurgical treatment of low grade laterite ores often require aqueous processing involving voluminous amount of water. However, efficient dewatering of the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Cyclohexene synthesis revisited: Selective benzene hydrogenation in continuous mode using Ru Nanoparticles supported on a binary oxide

Pages: 2218–2228

Preview Abstract

The use of ruthenium nanoparticles impregnated on a binary oxide (La_2O_3-ZnO) without using further additives (organic or inorganic) shows yields of cyclohexene up to 30 % under optimized conditions in a batch reactor. The optimization was performed by ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Submerged, recirculating jets: Flow regimes in the mixing of municipal slugde simulant

Pages: 2229–2235

Preview Abstract

Inadequate mixing of anaerobic digesters in wastewater treatment results in less than optimal biogas production and solids settling, which leads to costly shut-downs and cleaning. This study uses a sludge simulant to investigate the mixing phenomena of a ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Submerged, recirculating jets: Nozzle geometry and its effect on active volume creation in the mixing of municipal sludge simulant

Pages: 2236–2241

Preview Abstract

Anaerobic digestion (AD) of sludge is an integral step in municipal wastewater treatment. The complex rheology of

the feed to digester often leads to poor mixing and the formation of deadvolume. This work attempts to address the poor mixing issue. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Euler-lagrange large eddy simulation of a square cross-sectioned bubble column

Pages: 2242–2253

Preview Abstract

Bubble columns are widely used in the chemical and biochemical process industries. In order to develop design tools for engineering purposes, a large amount of research has been carried out in the area of CFD of gas-liquid flows. In this paper a transient ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Efficient photoelectrochemical water oxidation from nanoporous bismuth vanadate photoanode decorated by graphene linked graphitic carbon nitride

Pages: 2254–2260

Preview Abstract

Bismuth vanadate (BiVO4) has been considered as a promising semiconductor for photoelectrochemical solar water splitting, but it suffers from a major challenge on effective charge separation and transfer. Here, we report a facile fabrication of nanoporous ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Measurement and calculation of the electrical conductivity of model honey solutions

Pages: 2261–2269

Preview Abstract

The electrical conductivity of honey is limited by Codex Standard for Honey to be less than 0.8 mS/cm when 20 g of honey solids is diluted with 100 mL of water. It is influenced by the source of the honey, acidity, salt content, moisture and viscosity. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Properties and microstructural study of modified kappa carrageenan hydrogels for floating drug delivery system

Pages: 2270–2280

Preview Abstract

The floating hydrogels formulation were prepared by incorporating with different amount of calcium carbonates as gas forming agents into a mixture of kappa carrageenan/sodium salt of carbomethylcellulose solution. The effects of gas forming agent on ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Synthesis of sodium promoted hydrotalcite and its noble CO2 sorption properties

Pages: 2281–2283

Preview Abstract

Global warming is seriously accelerated by the increase of carbon dioxide (CO2) concentration in the atmosphere, which is mainly caused by fossil-fuel based energy system. In this reason, CO2 is classified into a main anthropogenic greenhouse gas, and ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Mixed matrix membranes embedding modified hydroxyapatite for protein adsorption

Pages: 2284–2288

Preview Abstract

Polyether sulfone (PES) is widely used for polymeric ultrafiltration and microfiltration membranes because of its toughness, good thermal resistance and chemical inertness. Hydroxyapatite (HAP) is a nano inorganic material and has good biocompatibility ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Numerical investigation on the flow, combustion and NOx emission characteristics in a 660 MWe tangential firing ultra-supercritical boiler

Pages: 2289–2296

Preview Abstract

A three-dimensional numerical simulation was carried out to study the pulverized coal combustion process on a tangential firing ultra-supercritical boiler. The realizable k-ε model for gas coupled with discrete phase model (DPM) for coal particles ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Konjac glucomannan-based microspheres for protein desalting and anchorage-dependent animal cell culture

Pages: 2297–2308

Preview Abstract

School of Energy and Environment, Southeast University, Nanjing 210096, P.R. China Konjac glucomannan (KGM) is a plant-derived neutral polysaccharide which is traditionally used as emulsifier and stabilizer in food and cosmetic areas. Recently, the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Examining the partitioning of coal particles in the reflux flotation cell

Pages: 2309–2316

Preview Abstract

Froth flotation is a three-phase gravity separation process used extensively in the coal and mineral industry to separate fine particles based on their difference in hydrophobicity. The hydrodynamic conditions established within a flotation device are ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Numerical modeling of iPS cell culture based on mass transfer in a culture environment

Pages: 2317–2325

Preview Abstract

Induced pluripotent stem (iPS) cells play important roles in tissue engineering. To achieve the practical use of iPS cells, the development of a large-scale culture technique while maintaining the undifferentiated state is required. Especially in terms of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Quantification of intrusion of chemical absorbent liquid into porous hollow fiber membrane and its influences on CO2 absorption rate in a membrane contactor

Pages: 2326–2334

Preview Abstract

A CO2 separation technique based on chemical absorption using hydrophobic porous hollow fiber membrane has been studied as a membrane contactor. Intrusion of the absorbent liquid into membrane pores causes an additional mass transfer resistance in the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effects of hydrogen addition on the chemical structure of silica film prepared by plasma CVD

Pages: 2335–2341

Preview Abstract

Since silica film has high gas barrier performance and high transparency, its application to gas barrier films is expected. When the silica film is prepared by plasma chemical vapor deposition (CVD), the reaction mechanism is complicated since the many ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of Cu/Zn atomic ratio on catalytic activity of Cu-ZnO-Al2O3 catalysts for water-gas shift reaction

Pages: 2342–2352

Preview Abstract

The Cu-ZnO-Al2O3 catalysts (CZA) prepared by a co-precipitation method were investigated for water-gas shift (WGS) reaction. The Cu/Zn atomic ratio during the co-precipitation method affected the catalytic activity of the CZA catalysts. The catalytic ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Development of a technology for supplying carbon dioxide to a greenhouse by utilizing fermentation of agricultural residue

Pages: 2353–2359

Preview Abstract

In cultivation greenhouses, CO2 is often provided by burning fossil fuels or directly from a gas cylinder to promote plant growth. However, fossil fuels are exhaustible energy resources and CO2 emitted by their combustion causes global warming. Also, CO, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Kinetic modelling of vacuum gas oil hydrocracking in a semi-batch reactor: Approach by distribution

Pages: 2360–2369

Preview Abstract

A model for hydrocracking a VGO over a bifunctional catalyst at 400 degreesC and 120 bar in a semi-batch reactor has been constructed. In this work liquid phase composition was analysed by two dimensional gas chromatography (GC x GC) and, to model these ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Rheological and morphological properties of nano calcium carbonate added poly (vinyl) alcohol-starch composites

Pages: 2370–2381

Preview Abstract

Study on rheological properties of polymer is always an ever expanding area for researchers. Influences of concentration of nano-calcium carbonate (CaCO3) in poly(vinyl) alcohol (PVOH) and PVOH/ starch blends were studied through rheological, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Conditioning and ion rejection of reverse osmosis membranes

Pages: 2382–2393

Preview Abstract

Reverse osmosis with polyamide spiral wound membranes is widely used for desalination, but also to concentrate liquids such as juice and milk. Assessment of the effectiveness of different cleaning regimes requires the development of suitable controls. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Fouling of reverse osmosis membranes used to concentrate milk

Pages: 2394–2404

Preview Abstract

Reverse osmosis with polyamide spiral wound membranes is used to concentrate milk to reduce its mass before transport to processing facilities. The apparent fouling of membranes was tested on a flat-sheet cross-flow laboratory system. The influence of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

The influence of water quality on sulfide mineral flotation - a review

Pages: 2405–2408

Preview Abstract

Mineral processing operations, in particular flotation, need substantial amount of water to carry out their activities. However, many of these operations are located in places where water is in short supply or economic developments are putting water ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Modeling of fast pyrolysis of wood for prediction of bio-oil composition

Pages: 2410–2417

Preview Abstract

In this work, a mathematical model is introduced that simultaneously solves the mass and energy balance of the fast pyrolysis process. For the yield calculation, the model uses starting values obtained from the literature. The mass balance is matched by ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Problems with low temperature CO2 capture from IGCC flue gases

Pages: 2418–2425

Preview Abstract

This research is focussed on the development of a suitable integrated cooling system for a CO2 capturing technology proposed by Surovtseva et al in 2011. The original research showed promising CO2 removal capacity from high-CO2 containing IGCC flue gases ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Process optimization for microencapsulation of coffee flavours using gas-saturated solutions via box behnken system

Pages: 2426–2436

Preview Abstract

Coffee is one of most traded commodities in the planet. There is a great interest in the use of coffee oil to increase the aromatic potential of the soluble coffee and coffee beverages, as well as a flavouring foods. Coffee oil is composed of majorly by ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Graft copolymer of alumina and poly(isobutyl vinyl ether) initiated by alumina mechanocations produced by heterogeneous bond scission of aluminum-oxygen bonds of alumina

Pages: 2437–2443

Preview Abstract

Surface-modified alumina (AO) with poly(isobutyl vinyl ether) (PIBVE) (AO-graft-PIBVE) was produced by ball milling of AO with isobutyl vinyl ether (IBVE) in vacuo under counterion-free conditions. AO mechanocations (AO+) on the freshly fractured AO ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Advanced morphology-controlled manufacturing of carbon nanotube fibers, thin films and aerogels from aerogel technique

Pages: 2444–2451

Preview Abstract

In this work, various carbon nanotube (CNT)-based products, including km-long CNT fibers, aligned CNT films and flexible CNT aerogels, have been successfully developed through a CNT aerogel technique. Over the wet spinning and array-drawing techniques ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Energy situation in Taiwan

Pages: 2452–2457

Preview Abstract

This article aims to introduce the situation and the recent trends of energy use, energy supply and demand, energy policy for sustainable using, and energy-economic relation in Taiwan. The recent energy pricing policy will be analysed and challenged. The ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Designing of new fluidity regulators for abnormal oil of South-Torgay oil fields

Pages: 2458–2468

Preview Abstract

The article is considering the experimental data obtained by the development of abnormal oil flow regulators, through the use of reagents of polymer type with the effect of synergy. It is shown that the new flow regulators are effective agents for ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Molecular conversion of phytochemicals during supercritical fluid extraction process from plant materials

Pages: 2469–2474

Preview Abstract

Functional phytochemicals have been extracted from natural plant materials using supercritical carbon dioxide with or without entrainer. Phytochemicals from plants are a wide variety of compounds including glycosides. Glycosides may be converted to ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of amine modification on CO2 capturing performance of nanoclay at elevated temperature and pressure

Pages: 2475–2484

Preview Abstract

Incorporation of various types of amines into the porous structures of nan-clays has been attempted to increase the affinity of CO2 toward the physical adsorbents. Physical characterization such as BET and FTIR analysis has confirmed that various types of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Production of an activated carbon from biomass waste

Pages: 2485–2489

Preview Abstract

In this study, by chemical activation using ZnCl2 and KOH, we produced an activated carbon from waste biomass such as banana peel, shochu (Japanese distilled spirit) waste, rice husk and cow manure. The pore structures (specific surface area and pore ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Kinetic analysis of enzymatic hydrolysis of cellulose based on enzyme adsorption to cellulose

Pages: 2490–2501

Preview Abstract

A better understanding of enzymatic hydrolysis mechanisms based on kinetics is required to develop reasonable conversion methods of cellulose for increasing productivity, such as effective biomass pretreatment and improved highly active enzymes. In this ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Supporting professional skills development in chemical engineering students

Pages: 2502–2510

Preview Abstract

The development of professional skills (e.g. leadership, project management, teamwork and communication) is fundamental for graduates to be competitive in a global job market. In Chemical Engineering courses opportunities for the development of these ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

A lifecycle assessment of meat processing products made from protein-based thermoplastics. University of Waikato School of Engineering

Pages: 2511–2521

Preview Abstract

Preserving meat quality is paramount during meat processing and rectal plugs are often used during slaughtering to reduce contamination. Plugs made from polypropylene contaminate rendered products, while Novatein plugs (the Port Jackson) will break down ...

ABSTRACT | PDF/EPUB

| 01 January 2015

DEM simulation of layer formation of granular materials in blast furnace burden distribution

Page: 2522

Preview Abstract

The blast furnace is a large counter-current chemical reactor that produces liquid iron by reduction of coke/ferrous materials. The radial distribution of granular feed materials significantly affects the gas flow distribution and burden descent behaviour ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Modelling of thin layer drying of macroalgae

Pages: 2523–2531

Preview Abstract

Algae based products have recently received attention as a potential new and sustainable industry, with applications in bioremediation of waste streams and biofuel production. However, there are significant hurdles to their successful implementation, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Techno-economic evaluation of sago biomass-based combined heat and power (CHP) system

Pages: 2532–2543

Preview Abstract

Sago biomass (barks and fibres) generated from sago starch extraction process can be converted into various products and bioenergy (heat and power). However, in current industrial practice, such biomass are deposited around the factory and washed off into ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

The influence of concentration of carbon sheets in hydrothermal synthesis of graphene quantum dots

Pages: 2544–2549

Preview Abstract

Graphene quantum dots (GQDs) as a derivative of graphene have attracted tremendous attention due to their great potential in a variety of advanced applications including optoelectronics, spintronics, energy conversion, sensing and so on. A green route to ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Iron oxide-type structured catalyst for water gas shift reaction

Pages: 2550–2551

Preview Abstract

This study was focused on a development of an iron oxide structured catalyst for water gas shift (WGS) reaction. The structured catalyst is composed of a regularly arranged iron oxide on a metal plate. This structured system could overcome a disadvantage ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Are your alarms safety related? : The role of Aalarms in functional safety

Pages: 2552–2553

Preview Abstract

Successful management of process alarms allows operators to respond more promptly and more effectively to process disturbances, thus reducing the demand on Safety Instrumented Systems (SIS). In addition, some alarms are so critical that they deserve ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Non-Newtonian effects on droplet breakup dynamics in a T-junction microfluidic channel

Pages: 2554–2563

Preview Abstract

The non-Newtonian droplets formation in microfluidic systems constitutes an essential study for rheological applications in drug delivery systems. Most studies of droplet formation and pinch-off concern Newtonian liquids mainly in theoretical, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Modelling of spray drying process: An overview on the physical phenomena and the predictions

Pages: 2564–2569

Preview Abstract

Spray drying is widely used to produce food and pharmaceutical powders. The capability to model the spray drying process offers an avenue to better predict and control the quality of the powders produced. This short review aims to provide an overview of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Fabrication of Micro/nanoscale Helical Fibers via Electrospinning and melt blowing

Pages: 2570–2573

Preview Abstract

Helical fibers of in micor/nanoscale have been of increasing interest because of their unique characteristics. In this study, we report the fabrication of micor/nanoscale helical fibers via electrospinning and melt blowing techniques. A flexible ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

The comparative study of brown carbon released from agricultural solid wastes and bio-briquette combustion

Pages: 2574–2584

Preview Abstract

The burning of agricultural solid wastes is an important source of brown carbon, biobriquette(with coal) is expected to reduce brown carbon emissions because of its efficient and clean combustion characteristics. This paper studied the influence of ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Dangerous goods compliance - a simplified and effective approach

Pages: 2585–2591

Preview Abstract

Dangerous goods stores, including minor stores can often be forgotten and miss-treated. Some examples of non-process infrastructure are laboratories, workshops and warehouses. Even minor stores of dangerous goods in remote locations, tucked away in ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Eulerian-Lagrangian full-loop simulation of an industrial-scale circulating fluidized bed boiler

Pages: 2592–2602

Preview Abstract

A three-dimensional (3D) full-loop simulation is adopted to predict the gas-solid flow and reaction characteristics during the combustion of mixture of municipal solid waste (MSW) and coal in an industrial-scale circulating fluidized bed (CFB) boiler. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Enzyme catalysis in ionic liquid based microemulsion

Pages: 2603–2613

Preview Abstract

Room temperature ionic liquids (ILs) are molten salts at or below room temperature. They are entirely composed of organic cations and organic or inorganic anions. As media, ILs have many advantages over conventional organic solvents, such as low ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Study on the effect of self-cleaning finishing to wool fabric

Pages: 2614–2618

Preview Abstract

The effect of self-cleaning finishing to wool fabric is pretreated by polybasic carboxylic acid and then modified by TiO_2/SiO_2 sol. The results showed that the free carboxyl group of polybasic carboxylic acid can augment the enrichment of TiO_2 and SiO_2 ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Nickel and vanadium removal from crude oil using starch xanthates under microwave irradiation

Pages: 2619–2635

Preview Abstract

The effects of starch xanthates on the removal of nickel and vanadium from Beijiang (Xinjiang in China) crude oil under microwave irradiation were investigated. A series of starch xanthates (SX1, SX2, SX3, and SX4) were synthesized from starch, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Predicting the adsorption performance of capture chromatography of proteins

Pages: 2636–2640

Preview Abstract

Dynamic binding capacity (DBC) of model proteins on ion-exchange chromatography gels was analysed based on a simplified pore diffusion model in order to develop a simple and fast method for designing a capture chromatography process. Effects of particle ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Experimental study on characteristics of the reactive flow mixing with gelation in a non-element mixer

Pages: 2641–2650

Preview Abstract

The mixing and gelation characteristics of 4 mass% PVA (polyvinyl alcohol) solution and 3 mass% borax solution in a Non-element mixer is investigated experimentally. When PVA and borax reacts, gel is formed. The Non-element mixer consists of a transparent ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of combustion enhancement by Kalium in continuously regenerating type PM removal device using fluidized bed

Pages: 2651–2656

Preview Abstract

Particulate matter (PM) is mainly soot emitted from combustor and becomes smaller with improvement of combustion technology. There is no suitable improvement method of existing PM removal device to remove PM2.5 (particle matter with aerodynamic diameters ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Four stages of heterogeneous air bubble nucleation at the liquid-solid interfaces in response to pressure reduction

Pages: 2657–2664

Preview Abstract

Heterogeneous nucleation of gas bubbles is central to many engineering fields, from boiling and heat transfer to cavitation and particle separation. In this paper, the origin and growth of gas bubbles on solid surfaces in water at an ambient temperature ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Vibration analysis in ladle metallurgy

Pages: 2665–2676

Preview Abstract

In ladle metallurgy bottom inert gas stirring plays an essential role in minimizing the compositional and thermal gradients of molten steel. Because of the working environment it is difficult to measure these process parameters directly and continuously. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Self-sustaining smouldering combustion of faeces as treatment and disinfection method

Pages: 2677–2684

Preview Abstract

Smouldering combustion is a novel solution for sustainable treatment of waste. This is a low cost, off-grid and self-sustaining technology, that has been recently applied for soil remediation. Due to the high energy efficiency and the application scale, ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Synthesis and application of core-shell zeolitic imidazole framework-8 (ZIF-8) catalyst in alkene hydrogenation

Pages: 2685–2695

Preview Abstract

Metal organic frameworks (MOF) are considered to have strong potentials as the catalyst support and host for immobilization of noble-metal catalysts. Many works have been reported on the preparations and applications of various metals/MOF composites. ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Amino acid profile, antihypertensive and antimicrobial properties of brown seaweed ('Sargassum horneri') hydrolysates obtained from pressurized hydrothermal extraction

Pages: 2696–2704

Preview Abstract

Marine macroalgae (seaweeds) are good potential sources of high biotechnological and high value interest due to its production of a great diversity of their biological activities. It has been used as food, fertilizer and for medicinal purposes for a long ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

The mitigation against crude oil wax solidification subsequent to heating: A sustainable crude oil logistic strategy

Pages: 2705–2716

Preview Abstract

Crude oil stored within conventional compartmented storage tanks on the seabed are constantly in a tug of war with phase transition. Oil platforms struggle to keep crude oil warm at liquid phase for transport purpose, while cold subsea temperature ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effects of the structure of inorganic porous hollow fiber membrane on Co2 desorption rate in a membrane flash process

Pages: 2717–2723

Preview Abstract

Carbon dioxide Capture and Storage is paid much attention as an effective way to reduce emission of CO2 into the atmosphere. But, in a chemical absorption method, the conventional absorbent regeneration method using steam requires large amount of heat ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Stability of Taylor Couette flow with an inner cylinder coated with anticorrosive resin

Pages: 2724–2731

Preview Abstract

Stability of vortices in Taylor Couette flow with an inner cylinder coated with anticorrosive resin was investigated

experimentally. Fluid exchange among stable vortices would not be remarkable and each vortex could be regarded as an independent ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Intrinsic reactivity of NO gas with metal impregnated bamboo activated carbon

Pages: 2732–2737

Preview Abstract

The metal-impregnated activated carbon was produced from bamboo activated carbon by soaking method of metal nitrate solution. The carbonization and activation of raw material was conducted at 900 degreesC. The specific surface area and pore size ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Catalytic effect of MgCl2 on cellobiose decomposition in hot-compressed water

Pages: 2738–2739

Preview Abstract

There is an increasing interest in producing renewable biofuels and platform chemicals from hydrothermal processing of biomass-derived sugars in hot-compressed water (HCW). Sugar monomers (i.e., glucose and fructose) are known to be good feedstock for ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Effect of film formers on liquid marble stability and drying mechanism

Pages: 2740–2750

Preview Abstract

Liquid marbles are droplets of fluid coated by a hydrophobic powder. Currently, liquid marbles have been found in cosmetics and hair care products. These commercial products have been found to last significantly longer than laboratory made marbles; the ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Size segregation of particles during filling a Paul-Wurth Hopper

Pages: 2751–2758

Preview Abstract

Granular materials are prone to segregate, driven by their various physical characteristics such as size, density, and shape. Segregation is often detrimental to subsequent processing where it can, for example, result in undesirable blend quality or ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Cellulose nanofibre preparation and post-treatment

Pages: 2759–2765

Preview Abstract

Cellulose nanofibre is a long filament with a typically lateral dimension less than 100 nm. Various manufacturing methods have been reported, among which the ball milling is one of the topdown techniques to produce highly crystalline cellulose nanofibre ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Graphene oxide based nanocomposite membrane for efficient CO2 separation

Pages: 2766–2769

Preview Abstract

Graphene oxide (GO) is a one-atom-thick two dimensional material which has unique mechanical, electrical and structural properties. Recently, the attempt to apply GO in gas separation membranes has attracted increasing attention due to the molecular ...

ABSTRACT | PDF/EPUB

| Conference Paper | 01 January 2015

Development of a first principle model of Czochralski process and its verification with real industrial data

Pages: 2770–2776

Preview Abstract

Although many models and control methods for Czochralski (CZ) processes have been proposed, only a small number of their industrial application results have been reported. In this research, a first principle model is constructed for controlling industrial ...

ABSTRACT | PDF/EPUB

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