Production Of Activated Carbon And Characterization From

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OCONNOR MACK

The Production of Activated Carbon from Coconut Palm Timber CRC Press
Activated Carbon Surfaces in Environmental Remediation provides a comprehensive summary of the environmental applications of activated carbons. In order to understand the removal of contaminants and pollutants on activated carbons, the theoretical bases of adsorption phenomena are discussed. The effects of pore structure and surface chemistry are also addressed from both science and engineering perspectives. Each chapter provides examples of real applications with an emphasis on the role of the carbon surface in adsorption or reactive adsorption. The practical aspects addressed in this book cover the broad spectrum of applications from air and water cleaning and energy storage to warfare gas removal and biomedical applications. This book can serve as a handbook or reference book for graduate students, researchers and practitioners with an interest in filtration, water treatment, adsorbents and air cleaning, in addition to environmental policies and regulations. Addresses fundamental carbon science and how it relates to applications of carbon surfaces Describes the broad spectrum of activated carbon applications in environmental remediation Serves as a handbook or reference book for graduate students, researchers and practitioners in the field
Production of Activated Carbon from Used Tires by Superheated Steam and Carvon Dioxide Activation in a Fixed Bed Reactor Intratec
A collection of articles, bibliographies, and list of patents and cost data on producing activated carbon from lignite. One article is based on the thesis by Carl Ross Bloomquist and the other is based on a thesis by E.H. Amick and work done by A.M. Cooley.
Production of Activated Carbon from Sewage Sludge for the Removal of Lead from Water Elsevier
This report presents a cost analysis of Powdered Activated Carbon production from coconut shell. In the process examined, the coconut shells are crushed and then carbonized into a charcoal, which is activated by steam at high temperatures. The Activated Carbon is cooled and ground into powder of specified mesh size. This report was developed based essentially on the following reference(s): (1) "Carbon, Activated", Kirk-Othmer Encyclopedia of Chemical Technology, 5th edition (2) "Carbon, 5. Activated Carbon", Ullmann's Encyclopedia of Industrial Chemistry, 2010 Keywords: Steam Activated Process, Carbonization, Activated Charcoal, Activated Coal, Carbo Activatus
Production of Activated Carbon from Sawdust Using Fluidized Bed Reactor with Steam Activation John Wiley & Sons
This thesis investigates the production of activated carbon, an environmentally friendly adsorbent which is used in many industries. Activated carbon can be derived from many different sources and produced in varying production processes. The raw materials used, activation process, and process parameters determine the physical properties and performance characteristics of the resulting carbon. Modifying these activation properties determines the porosity and pore volume distribution in the carbon. In preparation for commercial production, detailed mass balances are needed to quantify yield, quantify the masses of waste streams, understand the propensity to recycle the KOH, and to provide a benchmark for further optimization. A mass balance on the reaction of phosphoric acid and KOH with carbon is provided. Additionally, analyzing carbons can be expensive and time consuming, making it important to identify physical properties which indicate that a carbon may have favorable performance characteristics. The following paper proposes three ways of screening carbons: observing the mass loss in the chemical activation process, measuring the density of the carbon, and testing the methane uptake of the carbon in a rapid uptake fixture. Carbons made from different precursors, reacted with different activating agents, and heated at different process temperatures for different process hold times were analyzed.
Production of Activated Carbon from Pyrolysis of Coconut Shells Intratec
Recent years have seen an expansion in speciality uses of activated carbons including medicine, filtration, and the purification of liquids and gaseous media. Much of current research and information surrounding the nature and use of activated carbon is scattered throughout various literature, which has created the need for an up-to-date comprehensive and integrated review reference. In this book, special attention is paid to porosities in all forms of carbon, and to the modern-day materials which use activated carbons - including fibres, clothes, felts and monoliths. In addition, the use of activated carbon in its granular and powder forms to facilitate usage in liquid and gaseous media is explored. Activated Carbon will make essential reading for Material Scientists, Chemists and Engineers in academia and industry. Characterization of porosity The surface chemistry of the carbons Methods of activation and mechanisms of adsorptio Computer modelling of structure and porosity within carbons Modern instrumental analytical methods
Use of Xylitols for the Production of Activated Carbon Elsevier
The research objective was to produce activated carbon from palm-oil shells by one step pyrolysis and steam activation in a fixed bed reactor with the diameter of 100 mm. The studied variables were temperatures, times, palm-oil shells sizes and flow rates of air. The results showed that the optimum condition was 1.18-2.36 mm of palm-oil shells at 750 C for 2 hr with air flow rate of 0.72 nl/min, using steam as an activating agent. The characteristics of the resulted activated carbon with the yield of 19.66% were bulk density of 0.5160 g/cm3, 6.03% ash, iodine number of 620.16 mg/g, methylene blue number of 176.75 mg/g and 559.48 m2/g B.E.T. surface area. In addition, it had been found that when there was an adding of pyrolysis time with air before steam activation led to higher porosity development than one step pyrolysis and steam activation. From these experimental data, it was observed that the maximum surface area and adsorption capacity could be obtained from using 200 g of 1.18-2.36 mm of palm-oil shells at 750 C for 3 hr by adding pyrolysis with air for 30 min (0.72 nl/min) before steam activation. The resulting characteristics of the final product with the yield of 12.18% were bulk density of 0.5048 g/cm3, 7.54% ash, iodine number of 766.99 mg/g, methylene blue number of 189.20 mg/g and 669.75 m2/g B.E.T. surface area.
Production of Activated Carbon from Palm-oil Shell by Pyrolysis and Steam Activation in a Fixed Bed Reactor Intratec
This report presents a cost analysis of Powdered Activated Carbon production from coal. In the process under analysis, Activated Carbon is produced via a typical steam activation process. This report was developed based essentially on the following reference(s): (1) "Carbon, Activated", Kirk-Othmer Encyclopedia of Chemical Technology, 5th edition (2) "Carbon, 5. Activated Carbon", Ullmann's Encyclopedia of Industrial Chemistry, 2010 Keywords: Steam Activated Process, Carbonization, Activated Charcoal, Activated Coal, Carbo Activatus
A Study of the Production of Activated Carbon from Various Coals and Other Raw Materials, by A. C. Fieldner, P. E. Hall, and A. Egalloway Elsevier
This is the first comprehensive book covering all aspects of the use of carbonaceous materials in heterogeneous catalysis. It covers the preparation and characterization of carbon supports and carbon-supported catalysts; carbon surface chemistry in catalysis; the description of catalytic, photo-catalytic, or electro-catalytic reactions, including the development of new carbon materials such as carbon xerogels, aerogels, or carbon nanotubes; and new carbon-based materials in catalytic or adsorption processes. This is a premier reference for carbon, inorganic, and physical chemists, materials scientists and engineers, chemical engineers, and others.
Lignocellulosic Precursors Used in the Synthesis of Activated Carbon BoD – Books on Demand
High surface area, a microporous structure, and a high degree of surface reactivity make activated carbons versatile adsorbents, particularly effective in the adsorption of organic and inorganic pollutants from aqueous solutions. Activated Carbon Adsorption introduces the parameters and mechanisms involved in the activated carbon adsorption
The Production, Applications and Economic Study of Activated Carbon for Large Scale Production Including an Educational Study on Undergraduate Laboratory Modules
"Different activated carbons were produced from sewage sludge taken from Sharjah waste water treatment plant. Carbonization and activation were carried out in steam environment without an external flowing inert stream or in nitrogen environment. ... Activated carbons were analyzed by sorption of nitrogen." -- Abtract, p. 6.
Synthesis, Technology and Applications of Carbon Nanomaterials
Upgrades different bio-refinery residues including fermentation residues and pyrolysis residues into a value-added product of activated carbon. Investigates if lignocellulosic fermentation residues and pyrolysis residues are appropriate precursors for the production of activated carbon. Develops and optimizes an environmentally-friendly process for the production of activated carbon from the bio-refinery residues. Compares the quality of activated carbons produced from fermentation, pyrolysis, and agricultural residues. Develops catalysts supported on the activated carbons produced from fermentation and pyrolysis residues. Investigates if activated carbons produced from fermentation and pyrolysis residues are economically viable.
The Production of Activated Carbon from Lignite
This research was the study of the production of activated carbon from used tires by the processes of carbonization and activation with superheated steam and carbon dioxide in a fixed bed reactor with the diameter of 100 mm. The used tires were carbonized at 350 C for 60 min with the air flow rate of 0.52 nl/min. The characteristics of the resulted chars were yield of 41.40%, fixed carbon of 62.57%, ash of 15.30% and volatile matter of 22.13%. Then, the chars were activated with superheated steam and carbon dioxide. The optimum condition for activation was 0.60-1.18 mm of the chars size at 900 C for 45 min with air at a flow rate of 0.27 nl/min, carbon dioxide at a flow rate of 2.0 nl/min and superheated steam. The resulted activated carbon obtained yield of 27.99%, bulk density of 0.3590 g/cm3, ash of 21.05%, iodine number of 598.79 mg/g, methylene blue number of 247.08 mg/g, B.E.T. surface area of 658.75 m2/g, micropore area of 424.27 m2/g, external area of 234.48 m2/g and average pore diameter of 22.24 A.
Production of Activated Carbon from Discarded Compressed-wood
The production of activated carbon was evaluated using a biomass feed stock, corn cobs, as a precursor. The importance of the carbonization process and activation process are discussed and how nanopores and its unique surface chemistry allow activated carbon to perform advantageously in the transportation of natural gas. Adsorbed natural gas transportation is a valuable technique because of its ability to gain access and utilize methane from currently unavailable resources by conventional methods. A design approach was proposed and evaluated using the applications of activated carbon to transport natural gas including economic analyses on the large scale production of activated carbon. In addition, an experimental learning module was developed to study the mass and energy balance involved with operation of an AA Alkaline battery under a load current. An extension of the module allows evaluation of laboratory assembled batteries using granular anodic/cathodic materials. The system allows load resistance to be varied and measures voltage and temperature. The importance of batteries and the integration of chemical engineering education is discussed involving the battery-resistor circuit module.
Raw Material Characterization and Production of Activated Carbon
Biomass pyrolysis has the potential to become a major component of future biorefineries, since biomass is cracked to produce gases, liquid products (bio-oil) and solid products (bio-char). In order for the process to be economically feasible, it is necessary to obtain the maximum value from each stream, thus no by-product can be regarded as a waste. Bio-char is normally regarded as a by-product of fast pyrolysis, which is optimized to target biooil production. However, there are many potentially attractive applications for it: for example, it can be used for the production of activated carbons, which are the most commonly used adsorbent materials. In this study, a new reactor technology developed at ICFAR, the Jiggled Bed Reactor (JBR) is employed as a fast and reliable tool for the optimization of the production of activated carbons from biomass. Due to its excellent heating system, both slow and fast pyrolysis conditions can be achieved, and activation can be carried out. The results obtained in the JBR show good comparison with larger scale reactors, thus allowing the screening of new pyrolysis and activation conditions as well as different feedstocks in a fast and reliable way The impact of the type of feedstock, activation and pyrolysis conditions (fast/slow) on the final product characteristic and activation kinetics are studied. Finally, the performance of activated carbons produced in the JBR as adsorbents is evaluated for different environmental applications, such as the removal of ammonia and mercury from wastewater and of naphthenic acids from Oil Sands Process-affected water (OSPW). In particular, activated carbon produced from Kraft lignin is shown to outperform commercial activated carbon for wastewater treatment applications.
On-site Production of Activated Carbon from Kraft Black Liquor
Activated carbon is a widely used functional material. One of the most significant and resource demanding areas of activated carbon application is wastewater treatment in industry scale. The largest challenge, manufacturers face nowadays is the cost of commercially produced activated carbon. Moreover, the process of activated carbon regeneration is often complicated and cost demanding. The aim of this study is to investigate suitable conditions for production of activated

carbon from raw materials, namely - from olive pits. This would provide a profitable methodology of production of activated carbon from the cheap and renewable material. Four factors, known to affect the process of carbon activation were investigated in this study: nitrogen gas flow rate (200 - 400 mL/min), concentration of zinc chloride, as a chemical activator (25 -- 50 %), temperature of activation (600 - 800 °C) and activation time (1.5 - 3 hours). The quality of activation was refereed by comparing specific surface area for each of the factor combinations --

Production, Characterization, and Applications of Activated Carbon

Synthesis, Technology and Applications of Carbon Nanomaterials explores the chemical properties of different classes of carbon nanomaterials and their major applications. As carbon nanomaterials are used for a variety of applications due to their versatile properties and characteristics, this book discusses recent advances in synthesis methods, characterization, and applications of 0D -3D dimensional carbon nanomaterials. It is an essential resource for readers focusing on carbon nanomaterials research. Explores the chemical properties of different classes of carbon nanomaterials and their major applications Discusses recent advances in synthesis methods, characterization, and applications of 0D -3D dimensional carbon nanomaterials

A Study of the Factors that Affect the Preparation of Activated Carbons from Olive Pits

The present book discusses the principal lignocellulosic precursors used in the elaboration of activated carbons in different countries such as Asia, America, Europe and Africa; the different methods and experimental conditions employed in the synthesis of activated carbons, including one analysis of the principal stages of the preparation such as carbonization and activation (i.e., chemical or physical activation). Also, the recent and more specialized techniques used in the characterization of activated carbons are discussed in this book. For example, the techniques employed to determine textural parameters (mercury porosimetry and gas adsorption isotherms at 77 K) and different spectroscopies to determine chemical functionality (Raman, FT-IR, etc.) and other X-Ray techniques. Additionally, an overview of the application of activated carbons obtained from lignocellulosic precursors for wastewater treatment. Specifically, the analysis and discussion are focused on the advantages and capabilities of activated carbons for the removal of relevant toxic compounds and pollutants from water such as heavy metals, dyes, phenol, etc. Finally, the use of pyrolysis method for the valorization of two Mexican typical agricultural wastes (orange peel and pecan nut shell) for energy and carbon production is considered in this book.

Production of Activated Carbon and Its Catalytic Application for Oxidation of Hydrogen Sulphide

This report presents a cost analysis of Powdered Activated Carbon production from coconut shell. In the process under analysis, Activated Carbon is produced via a chemical activation process using phosphoric acid. This report was developed based essentially on the following reference(s): (1) "Carbon, Activated", Kirk-Othmer Encyclopedia of Chemical Technology, 5th edition; (2) "Carbon, 5. Activated Carbon", Ullmann's Encyclopedia of Industrial Chemistry, 2010 Keywords: Chemical Activation Process, Phosphoric Acid, Activated Charcoal, Activated Coal, Carbo Activatus

Activated-carbon Production at I.G. Farben-industrie, Leverkusen

Activated Carbon and Wood Charcoal Production and Trade Patterns