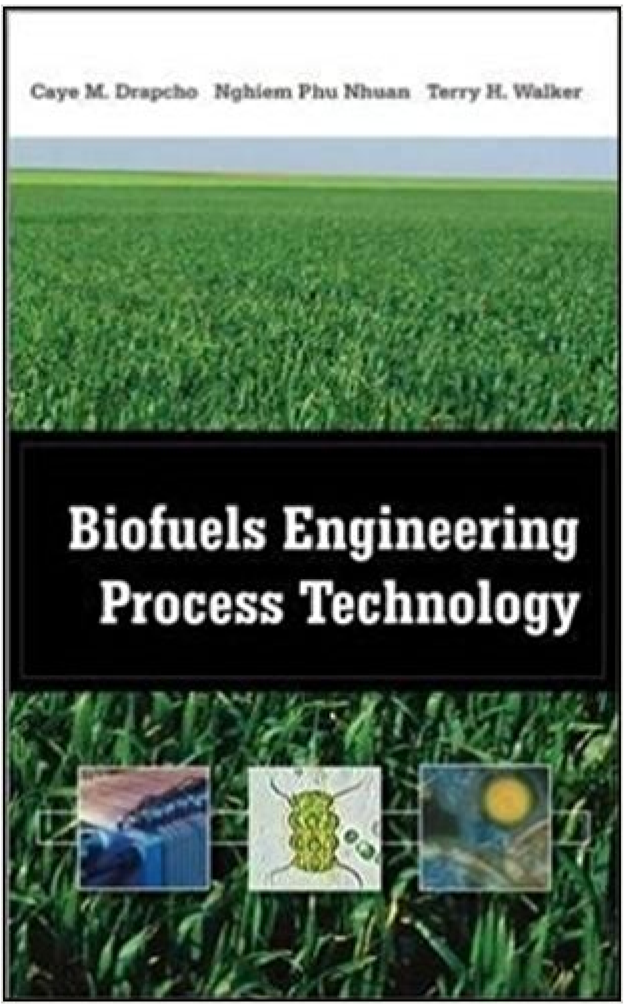
Biofuels Engineering Process Technology (Mechanical Engineering)



Synopsis

New Process Technology for Developing Low-Cost, Environmentally Safe Biofuels Rising fuel prices have created a surge in the worldwide demand for biofuels made from plant and animal feedstocks. Filled with a wealth of illustrations, Biofuels Engineering Process Technology fully explains the concepts, systems, and technology now being used to produce biofuels on both an industrial and small scale. Written by a team of leading biofuels experts, this lucid guide presents a complete introduction to biofuels and biorefining processesâ |state-of-the-art information on biofuels processed from fermentations of ethanol, hydrogen, microbial oils, and methaneâ |new material on the production of biodiesel from plant and algal oilsâ |and the use of microbial fuel cells to produce bioelectricity. Biofuels Engineering Process Technology takes readers step by step through: The key concepts, systems, and technology of biofuels A review of the basic concepts of fermentation pathways and kinetic modeling of bioreactors Biofuels produced from fermentations of agricultural feedstocks and biomass-ethanol, hydrogen, microbial oils, and methane Biodiesel fuels processed from the chemical conversion of microbial and plant oils Bioelectricity produced from microbial fuel cells The latest sustainable biorefinery concepts and methods Inside This Cutting-Edge Biofuels Engineering Guide â ¢ Introduction â ¢ Fuels from Fermentations: Ethanol â ¢ Hydrogen â ¢ Microbial Oils â ¢ Methane â ¢ Fuel from Chemical Conversion of Plant and Algal Oils: Biodiesel â ¢ Microbial Fuel Cells â ¢ Technical Resources

Book Information

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Customer Reviews

Caye M. Drapcho, Ph.D., is an Associate Professor and the Graduate Coordinator in the Department of Biosystems Engineering at Clemson University. She has over 13 years of experience in bioprocess and bioreactor design. Nhuan PhÃº NghiÃªm, Ph.D., is a Senior Research Biochemical Engineer in the Crop Conversion Science and Engineering Research Unit at the Eastern Regional Research Center, Agricultural Research Service, U.S. Department of Agriculture, and also an Adjunct Professor in the Department of Agricultural and Biological Engineering at Clemson University. He has more than 20 years of experience in bioprocess engineering in industrial and federal research laboratories. Terry Walker, Ph.D., is an Associate Professor in the Department of Biosystems Engineering at Clemson University. He has over 10 years of experience in bioprocess engineering, specializing in fungal fermentation, bioproduct separations, and bioavailability studies.

Its a straight forward book. It has all that you needs. The book explains everything needed for the biofuel processes.

Biofuels Engineering Process Technology by Drapcho et al.A McGraw Hill Publication 2008Reviewed by: Dr. Joseph S. MarescaThe authors begin by explaining the justification foralternative energy.The reasons set forth are:o diminishing oil reserves and the increasing difficulty and cost of extractiono global climate change considerationso increasing fuel priceso the need for energy independenceThe largest oil reserves are in Saudi Arabia, Canada,Iran, Iraq, Kuwait, UAE and Venezuela.Geothermal and solar energy have less than 20% efficiencyat the current technological learning curve but zero emissions.Biofuels are substantially carbon neutral accordingto the authors. There was a considerable presentation onfuels derived from fermentations;such as, ethanol, hydrogen, microbial oils and methane.The strategy for a bioreactor design is based upon themaximum rate of production formation, biomass productionor substrate utilization. Fuel treatments to reduce firehazards can contribute 54 MT (million tons) of bio mass yearly.Muni solid waste has the potential for biofuel production.Vegetable based fuels capture solar energy through plantsand photosynthetic pigments. These veggie based fuelssequester CO2 from the atmosphere as a primary carbon source.The carbon is biologically converted to greater energystarches, celluloses, proteins and oils as storageand structural compounds. Some algae can convertCO2 to 60% - 70% of their dry weight in the form of storageoils.Microalgae have very versatile growing conditionsdating back to the earliest eukaryotic organismson the earth. Algae can inhabit many different environmentsas long as water and micronutrients exist alongside.Algae have been shown to accumulate a high level oflipids consisting of over 80% of their dry weight .The microbial fuel cell or MFC is a specialized biologicalreactor where the electrons processed during microbialmetabolic activity are intercepted to provide useful electricpower. In an MFC, the oxidation of the electron donorcompound is physically separated from the terminal electronacceptor. The microbes are grown in the anode chamber wherethe electron donor compound is oxidized, with the electronstransferred to the anode instead of oxygen or an externalelectron acceptor. MFCs convert chemical to electrical energy.Emissions from biodiesel in combustion engines are greatlyreduced compared to the petroleum diesel. Nonetheless,nitrogen oxide emissions constitute a drawback.Decreases in NO emissions are possible with correctionsin injection timing and combustion temperatures. Theseincremental costs may add more steps to the process and(by implication) more costs.The thermodynamic properties with respect to temperatureof biodiesel fuels compared to diesel are higher for biodiesel.Higher flash points result in a safer fuel for handling.Density and viscosity of biodiesel is higher than forpetroleum fuels and alcohols. Electricity fromgasification of biomass has a low production cost at5 cents per KWH. Simultaneous esterification of freefatty acids to alkyl esters will occur due to increasedbiodiesel yields from lower quality feedstocks.Esterification involves two reactants (alcohol+ acid)to form an ester product. Esters are common in organicchemistry and may smell like fruit.This characteristic leads to the application of estersin fragrances. Ester bonds may be found in polymers.The yield of the product in esterificationmay be improved by using Le Chatelier’s principle.Esterification is a reversible reaction as opposed to anirreversible one. Hydrolysis or "water splitting" is theaddition of water and a catalyst like NaOHto an ester to arrive at the sodium salt of thecarboxylic acid and alcohol. As a result of this reversibility,many esterification reactions are equilibrium reactions.These reactions go to completion by Le Chatelier’sprinciple.An irreversible process is a process that cannot returnboth the system and the surroundings to the original state(s)assuming a reversal of the original process .Most processes, of course, are irreversible processes(or nonequilibrium processes).Letting air from a balloon released into a room is anirreversible process.Overall, these irreversible processes are a consequenceof the second law of thermodynamics,which is frequently defined in terms of the entropy ordisorder of a system.There are several ways to phrase the second law ofthermodynamics. There is a limit on how efficient anytransfer of heat can be. According to the secondlaw of thermodynamics, some heat will be lost in theprocess. This loss explains why it is not possible tohave a completely reversible process in everyday life.For example, a car engine doesn’t give back the fuel ittook to drive up a hill even if thecar coasts down a mile long hill thereafter.The authors concentrate efforts substantially on biofuels.Ultimately, the "Artificial Sun" may prove to be thegame changer. Shortly , a scientific team will beginattempts to ignite a tiny manufactured star inside alab and trigger a thermonuclear reaction.Its goal is to generate temperatures of more than100 million degrees Celsius and pressures billionsof times higher than those found anywhere on earth,from a tiny speck of fuel.The National Ignition Facility (NIF) in Livermorewill utilize a laser that concentrates 1,000 timesthe electric generating power of the United Statesinto a billionth of a second. The result should be anexplosion in the reaction chamber which will produce10 times the amount of energy used to create it.Until now, such fusion has only been possible insidenuclear weapons and highly unstable plasmas createdin incredibly strong magnetic fields. The work atLivermore could change the historical applications mix.Source: NIF, LivermoreOverall, the authors provide a very thorough renditionof biofuels engineering with excellent referencematerials at the end of each chapter. Readers who areconversant in organic chemistry, materials sciencestructure of matter and thermodynamics will appreciatethe superior technical presentation embodied in thistext . There is an extensive scientific presentation ofconversion factors and constants at the end of the book.

Guide to Financial Technology(Fin Tech, Fintech Bitcoin, financial technology fintech, Fintech Innovation, Fintech Gold, ... technology,equity crowdfunding) (Volume 1) FINTECH: Simple and Easy Guide to Financial Technology(Fin Tech, Fintech Bitcoin, financial technology fintech, Fintech Innovation, Fintech Gold, Financial services technology,equity crowdfunding) Thermodynamics: An Engineering Approach (Mechanical Engineering) Engineering Mechanics: Statics (Mechanical Engineering) Water and Wastewater Engineering (Mechanical Engineering)