**Book Reviews**

**AOCS publishes *The Biodiesel Handbook***

*Here’s what Biodiesel Magazine has to say about *The Biodiesel Handbook* from AOCS Press*

The American Oil Chemists’ Society (AOCS) recently released one of the most comprehensive biodiesel books ever published. *The Biodiesel Handbook*, published by AOCS Press, is now available for purchase. The handbook serves as a comprehensive reference guide for biodiesel industry professionals, novices, investors and project developers alike. The handbook was edited by experts in the field:

- Gerhard Knothe of the USDA-ARS National Center for Agricultural Utilization Research (Peoria, Illinois),
- Jon Van Gerpen of the University of Idaho’s Department of Biological and Agricultural Engineering, and
- Jurgen Krahl of the University of Applied Sciences (Germany).

The book was compiled from the contributions of nearly three dozen authors including Knothe, Van Gerpen, Krahl, Steve Howell of Marc-IV Consulting, Robert McCormick of NREL, Dieter Bockey of the Union for Promoting Oilseed and Protein Plants, Joe Jobe of the National Biodiesel Board and many others.

It is the mission of the AOCS to provide a global forum for professionals in lipids and related materials through the exchange of ideas, information science and technology. The AOCS Books and Special Publications Committee, the group responsible for choosing to publish the book, includes AOCS-member professionals from a wide range of fields and backgrounds, including both the public and private sectors.

“The concept [of biodiesel production] itself may appear simple, but that appearance is deceiving since the use of biodiesel is fraught with numerous technical issues,” the editors state in the book’s introduction. “Accordingly, many researchers around the world have dealt with these issues and in many cases devised unique solutions. This book is an attempt to summarize these issues, to explain how they have been dealt with, and to present data and technical information.”

The handbook also addresses what the editors call “countless legislative and regulatory efforts around the world” that helped pave the way for the widespread production and use of biodiesel. To provide a full picture of the biodiesel concept, the book addresses the history of vegetable oil-based diesel fuels, and the basic concept of the diesel engine. Primarily, the book covers the basics of biodiesel production (transesterification, feedstocks and process technologies); analytical methods used in the industry, an overview of fuel properties (cetane numbers, viscosity, cold weather properties and oxidative stability); soybean oil composition for biodiesel; the impact of biodiesel on pollutant emissions (including the influence of biodiesel and different petrodiesel fuels on exhaust); the current status of biodiesel in the United States, Europe and other parts of the world; quality management; and other important topics.

The 304-page book is hardbound. It is available to non-AOCS members for $98 and AOCS members for $85. It can be ordered online at www.aocs.org or by phone at (800) 336-AOCS (United States and Canada) or +1-217-359-5401 ext. 148 (for all other countries).

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**Extracts & Distillates**

**Olive oil adulteration detection**


Fourier Transform (FT) Raman and FT (mid-infrared) (MIR) spectroscopic analyses were made on entire oil and the related unsaponifiable matter. Univariate and multivariate statistical models were designed and applied. A complete discrimination between olive and hazelnut oils was possible and allowed detection of adulteration of olive oil with hazelnut oil at levels >8%. Blends of Turkish olive and hazelnut oils could also be discriminated, but the limit of detection is higher when the blends are of edible oils from diverse geographical origins.

**Peroxy radical scavenging capacity assay**


A simple, rapid and sensitive method for determining peroxyl radical scavenging capacity (PSC) of both model hydrophilic and lipophilic antioxidant compounds and food extracts was developed, based on the degree of inhibition of dichlorofluorescein oxidation. Antioxidant activity was measured as the dose (µM) required to cause 50% inhibition of the reaction (EC50). Whole grain antioxidant activities for wheat and rice were determined to be >98% hydrophilic and <2% lipophilic. The PSC assay was accurate, precise and reproducible and gave results comparable to other methods. It can be routinely used to analyze or screen both hydrophilic and lipophilic antioxidants of food extracts and may provide a valuable alternative biomarker for epidemiological studies of chronic diseases.

**Soybean oil degumming by ultrafiltration**


Degumming of soybean oil was made using an ultrafiltration membrane prepared from polyethersulfone. Studies were conducted on crude desolvengested oils and oil/hexane (1/3) miscella. Desolventized oil showed a lower permeate flux than the oil/hexane miscella due to its greater viscosity. Removal of up to 89% of phospholipids was achieved. Changes in color, free fatty acid and tocopherol contents were observed. Scanning electron microscopy revealed the membrane integrity to be unaffected by exposure to hexane for up to 72 h at 50 °C.
ultrafiltration technology is considered to be a suitable alternative to currently used degumming processes.

**VLCPUFA production in GM India mustard**


Stepwise metabolic engineering strategy has allowed the transgenic production of significant amounts of arachidonic acid (AA) and eicosapentaenoic acid (EPA) in Indian mustard (*Brassica juncea*) seeds. A series of transformations with increasing numbers of transgenes gave incremental production of very long-chain polyunsaturated fatty acids (VLCPUFA), achieving levels of AA at up to 25% and EPA at 15% of total seed fatty acids. Both fatty acids were essentially restricted to seed triacylglycerols with AA located preferentially at sn-2 and sn-3 positions, and EPA distributed almost equally between all three positions. The DHA biosynthetic pathway can be reconstructed in transgenic plant seeds allowing the potential for large-scale production of DHA in oilseed crops.

**PAH determination in canned vegetable oils**


Vegetable oils from canned vegetable and fish and oil-based sauces were analyzed for the presence of polycyclic aromatic hydrocarbons (PAH). Fifteen per cent of the oil samples from vegetable products exceeded the 2-ppb level for benzo(a)pyrene (BaP). The highest PAH concentration was found in the oil from a grilled mushroom sample. None of the canned fish samples exceeded the limit for BaP, but the olive oil from canned tuna contained significant levels of PAH including BaP. The possibility was considered that PAH in canned oil from vegetable products arose from the vegetables.

**Palmitic acid may increase risk for obesity**


Dietary intakes of palmitic acid (PA) and oleic acid (OA) at different levels were examined in 43 healthy young adults over a 28-day period. The high PA diet had 40% energy as fat with 16.8% PA and 16.4% OA; the high OA diet at 40% energy as fat with 1.7% as PA and 31.4% as OA. Increases in dietary PA decreased fat oxidation and daily energy expenditure as determined from respiratory quotient measurements. Decreases in PA and increases in OA produced the opposite effect. The conclusion was that dietary PA may increase the risk of obesity and insulin resistance.