OMICS Group Conferences
Accelerating Scientific Discovery

World Congress on
Petrochemistry and Chemical Engineering
November 18-20, 2013 Hilton San Antonio Airport, TX, USA

Biodiesel and glycerol separation through membrane technology

Maria Carolina Sergi Gomes, Wardleison Martins Moreira[2], Pedro Augusto Arroyo[2] and Nehemias Curvelo Pereira[2]
[1]Federal University of Technology, Brazil
[2]State University of Maringa, Brazil

Biodiesel is produced from renewable energy sources and its use reduces the air-pollutant emissions when compared with petroleum diesel fuel. The most common way to produce biodiesel is by transesterification. In this reaction, a triacylglycerol, present in oils and fats, reacts with a short chain alcohol in the presence of a catalyst to produce esters and glycerol as co-product. The membrane technology is an alternative to the traditional process of separating biodiesel and glycerin. This study investigated the efficiency of ultrafiltration with ceramic membranes in separating and purifying biodiesel produced by ethylic transesterification of crude canola oil, using sodium hydroxide as a catalyst. Experiments were carried out with α-Al_2O_3/TiO_2 tubular ceramic membranes with average pore size of 0.05 μm and 20 kDa, and filtration area of 0.005 m^2. It was developed a methodology of acidified water addition to the reaction mixture, to promote demulsification of the mixture and, thus, the glycerol retention by the membrane. Ultrafiltration runs were performed in batch mode with water addition of 10 wt.%, at 1.0, 2.0, and 3.0 bar transmembrane pressures and 50 °C. Membrane performance was evaluated based on the capacity of glycerol retention and on the permeate flux values. The higher free fatty acid content in the crude canola oil, not only favored the formation of an aqueous phase containing glycerol, which was retained by the membrane, but also resulted in the lowest flux decline rates. The ultrafiltration was efficient in removing glycerol, since the highest glycerol content in the permeate was 0.013 wt.%.

Biography

Maria Carolina Sergi Gomes obtained her M.S. and Ph.D. in Chemical Engineering at State University of Maringa, Maringa, Paraná, Brazil in 2008 and 2012, respectively. She is professor at Federal University of Technology-Paraná (UTFPR) and her research is focused on biodiesel production process, particularly the use of membrane technology for separation and purification.

mcarolinagomes@yahoo.com.br