Mehmet Unsal et al., J Fundam Renewable Energy Appl, 5:5
http://dx.doi.org/10.4172/2090-4541.S1.002

OMICS International
conferenceseries.com

International Congress and Expo on
Biofuels & Bioenergy
August 25-27, 2015 Valencia, Spain

CatLiq- Catalytic hydrothermal liquefaction process from pilot scale to demo scale

Mehmet Unsal[1], Haydar Livatyali[2], Parvana Aksoy[1], Serhat Gul[1] and Alper Onoglu[3]
[1]TUBITAK MRC Energy Institute, Turkey
[2]Yildiz Technical University, Turkey
[3]ALTACA Environmental Technologies & Energy Inc., Turkey

The CatLiq® process is a catalytic hydrothermal liquefaction process that takes place at water supercritical conditions in the range of 230-250 bar and 350-420°C and the obtained biocrude oil is called as "Altaca oil". "Altaca Oil" is synthesized from aqueous bio-waste such as lignocelluloses, proteins, fats and carbohydrates and their mixtures. In the development phase of the CatLiq® process, after a pilot scale studies, a demonstration plant was scaled up. The upgraded version of the lab pilot plant is currently operational in Gebze-Kocaeli, Turkey, and a series of tests have been conducted to optimize conversion conditions of bio-gasification and sewage sludge. Using delivered data via these tests, the pre-commercial demonstration plant was designed and, the plant is under construction at the Gönen, Balikesir/Turkey. During designing studies, for thermodynamic calculation and process simulation Aspen HYSYS 8.4, and Chemcad 6.1, for heat exchanger designs Aspen HTFS, for piping Bentley, for the stress analysis and materials choise PV Elite, and for fluid dynamic and heat transfer Fluent were used. General requirements were observed for ASME Section 3 Div.2 in the pre-commercial demonstration plant design. The demonstration plant mass flow feeding rate is 15 ton/h, while the mass flow feeding rate of pilot plant is 60 kg/h. It is limited for continuous process due to the fact that the pilot plant has some fluid behaviors as fouling, plug, particle flow. It has been forecast that these limitation will be solved at the scale up. The demonstration plant is an energy integrated system with heat recovery of 70%. Each waste heat stream at the plant was investigated in terms of its waste heat quantity (the approximate energy in the waste heat stream), quality (typical exhaust temperatures). Energy content of waste heat streams was considered as a function of mass flow rate, composition, and temperature, and was evaluated based on process energy consumption, typical temperatures, and mass balances. Ultimately, waste heat of any equipment was used for reaction energy of other equipment. Moreover, the plant was scaled up based on Best Available Technology. The plant is based on transforming the waste into a useful material and minimalizing waste production of the process.

Biography

Mehmet Unsal graduated from Chemical Engineering in 1999 from Firat University, Turkey and then completed his PhD on Process Development and Optimization in Biodiesel Production at Gebze Technical University. He joined TUBITAK MRC eleven years ago. He is still working at the Energy Institute at TUBITAK MRC as a Principal Researcher under the "Gasification and Combustion of Biomass and Coal" research group. His research is mainly based on process development, process optimization, equipment design, biogasification, and upgrading of biocrude oil production and upgrading, biodiesel production, combustion and gasification of coals and biomass, waste heat recovery.

mehmet.unsal@tubitak.gov.tr

Notes: