

International E-Conference on

RENEWABLE ENERGY AND RESOURCES

April 26, 2021 | Webinar

Dolomite as heterogeneous catalyst in biodiesel synthesis

Ieva Gaide and Violeta Makareviciene

Vytautas Magnus University Agriculture Academy, Lithuania

The limited reserve of fossil fuels prompts the consideration of alternative fuels from renewables.

Most renewables do have environmental advantages over the conventional fuels, such as greenhouse gas and pollution reduction. Biodiesel is a mixture of fatty acid and short-chain alcohol esters, and it is obtained from a transesterification process that uses either vegetable or animal fats, an alcohol and a catalyst. In the present work, we investigated optimum conditions for biodiesel synthesis from rapeseed oil and butanol using dolomite as a heterogeneous catalyst. Firstly optimum conditions for dolomite preparation was studied. Optimum dolomite fraction size was obtained 0.315–0.1 mm and calcination temperature 850 °C was used to convert CaCO₃ and MgCO₃ to CaO and MgO, content of oxides in dolomite were investigated. It was obtained that dolomite which we used for rapeseed oil transesterification contained 29.3% of CaO and 19.1% of MgO. Transesterification tests were conducted in a conical flask, which was connected to a condenser, a thermometer with a temperature controller and a mixer (at a constant mixing speed of 350 min⁻¹). Response surface methodology central composite design (CCD) was employed to determine the optimal reaction conditions. The two optimum conditions of transesterification process were obtained. In both cases the optimum reaction duration – 8 hours and the optimum reaction temperature – 110 °C, in one case the molar ratio of methanol to oil – 13.72:1 and the catalyst amount – 5.24 wt%, in another case the molar ratio of methanol to oil – 10.02:1 is enough and the catalyst amount should be – 6.59 wt%. The ester yield obtained was 94.55%.

Keywords: heterogeneous catalysis, dolomite, biodiesel, butanol

Biography:

Ieva Gaide is PhD student in Environmental Engineering in Vytautas Magnus University Agriculture Academy. Her field of study is related to the heterogeneous synthesis of biodiesel using natural rocks as heterogeneous catalysts.