Optimization for coproduction of biodiesel and value added chemical using response surface methodology

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The application of response surface methodology (RSM) for modeling and optimization of the influence of variables on the coprodiction of biodiesel and glycerol carbonate is discussed. A central composite rotatable design (CCRD) was used to investigate the effect of molar ratio, enzyme loading and reaction temperature on the coproduction of biodiesel and glycerol carbonate. The range of variables were a molar ratio of 0.96 - 11.05, enzyme loading of 15.91 g/L - 184.09 g/L, and reaction temperature of 26.36 ℃ - 93.64 ℃. The optimum conditions for biodiesel production were obtained when using methanol to oil molar ratio of 6.0, 100 g/L of Novozym 435, at 56.45 °C. And Analysis of variance (ANOVA) of biodiesel presented P=0.002 (<0.05) of lack-of-fit and 93.2% of R^2 value. The optimum conditions for glycerol carbonate production were obtained when using molar ratio of 6.0, 100 g/L of Novozym 435, at 65.35 °C. And ANOVA of glycerol carbonate presented P=0.001 (<0.05) of lack-of-fit and 96.3% of R^2 value.