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Transesterification of Agriculture Waste Fat.

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TRANSESTERIFICATION OF AGRICULTURE WASTE FAT

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Several transesterification processes of potential large scale application have been studied:

- transesterification of the waste fats with methanol catalysed by acids, alkaline and ion exchanger to produce biodiesel
- enzymatic glycerolysis of waste fats to produce a mixture of the glycerides to be used in the manufacture in food and cosmetics industry
- enzymatic transesterification of the waste fats with 1,2,3-trimethylolpropane, being of interest in view of the only so far reported synthesis based on the use of the methyl esters.

Reaction mixture containing waste fats, methanol and pertinent catalyst in ratios 1:20:0.05 was heated on boiling point for 5 hours in magnetically stirred tank reactor. Reaction conversion was in limits 45-80% depending on process conditions and catalyst used.

Heated magnetically stirred reactor with a reaction mixture containing waste fats, glycerine (1,2,3-trimethylolpropane), enzyme was dissolved in t-butanol. Optimum conditions were found by varying several process parameters like, reactant to substrate mol. ratio, and temperature. Optimal reaction conditions for enzymatic reaction were as follows: Reaction temperature 48°C in using glycerine to fat molar ratio = 2 and t-butanol (as solvent) to fat molar ratio = 4.

In a typical example, transesterification of waste fats with 1,2,3-trimethylolpropane (TMP) at TMP/F mol. ratio = 2,5, t-B/F mol. ratio = 33, 48°C and 15 min residence time afforded the reaction product consisting of 4 % of free fatty acids, 44.3 % of the fat acids mono-esters (24.5 % 1-glycerides, 5% 2-glycerides, 70.5 % mono ester of fat with 1,2,3-trimethylolpropane), 42.0 % of the di-esters (27.0 % 1,2-diglycerides, 49.5 % 1,3-diglycerides, 23,5 % di-esters of fat with 1,2,3-trimethylolpropane), and 10% tri-glycerides.

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