Sustainable Biodiesel Production from Alternative Oils

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THE MONO ALKYL ESTERS OF LONG CHAIN FATTY ACIDS DERIVED FROM RENEWABLE LIPID FEEDSTOCK, SUCH AS VEGETABLE OILS OR ANIMAL FATS

ENVIRONMENTAL BENEFITS
- Non edible
- Drought resistant
- High yield of oil extraction
- High oil yield
- Moderate water needs

BAD PROPERTIES
- Bad properties (metals, viscosity...)

SELECTED FEEDSTOCK
- *Brassica juncea*
  - Optimal properties
  - Non edible
  - Drought resistant
  - High yield of oil extraction
  - High oil yield
- *Cartamus tinctorius*
  - Optimal properties
  - Non edible
  - Drought resistant
  - Low yield of oil extraction
  - Low oil yield
- *Rapeseed*
  - Optimal properties
  - High yield of oil extraction
  - High oil yield
  - Moderate water needs
  - Edible
- *Waste cooking oil*
  - Green
  - Non edible

PROPOSED METHOD FOR THE DEACIDIFICATION: PRE-ESTERIFICATION

EN 14214: FFA < 0.5% wt
The reaction of deacidification

\[
\text{RCOOH} + \text{CH}_2\text{OH} \rightarrow \text{acid catalysis} \rightarrow \text{RCOOCH}_2 + \text{H}_2\text{O}
\]

\text{FAME}

\text{Fatty Acids} \quad \text{MeOH}

The selected catalyst:
Amberlyst® 46 (Dow Advanced Materials)

SURFACE FUNCTIONALIZATION:
- No limitation to the mass transfer
- Minimization of side-products
- Stable performance over time

Reaction Conditions

**MILD CONDITIONS**

63° C
Atmospheric pressure
max conversion within 6 hours
Slurry reactor
Deacidification results

Blending different oils results in beneficial effects for the deacidification reaction.

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**Biodiesel production**

A biodiesel of 98.5% of purity was obtained from the Brassica juncea oilseed deacidified with the pre-esterification method.