PRODUCTION AND CHARACTERIZATION OF BIODIESEL OBTAINED BY TRANSESTERIFICATION CATALYSED BY IONIC LIQUIDS BASED ON IMIDAZOLIUM

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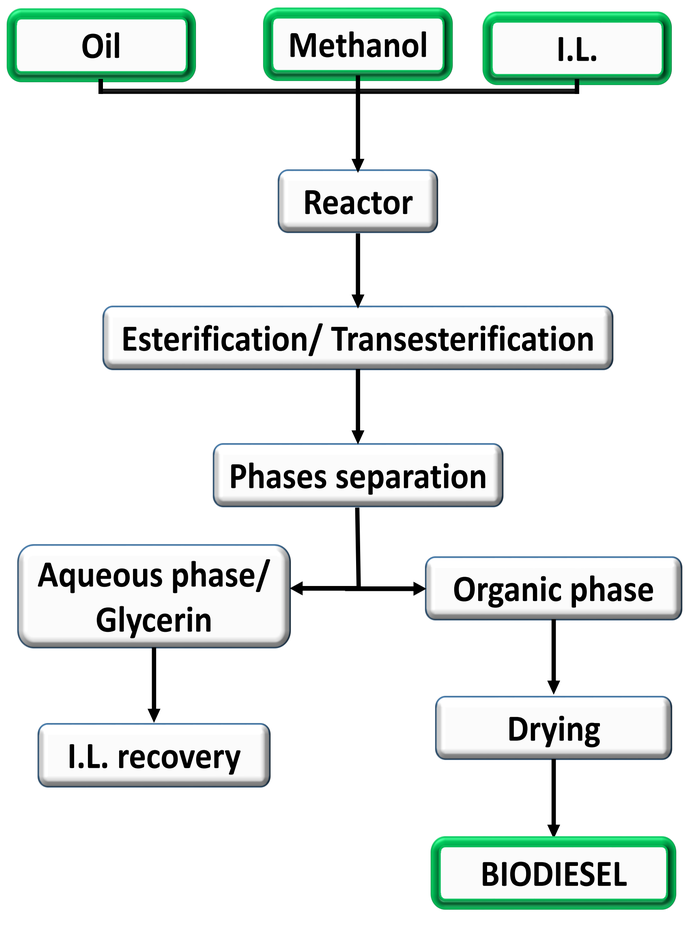
Background

Production of Biodiesel

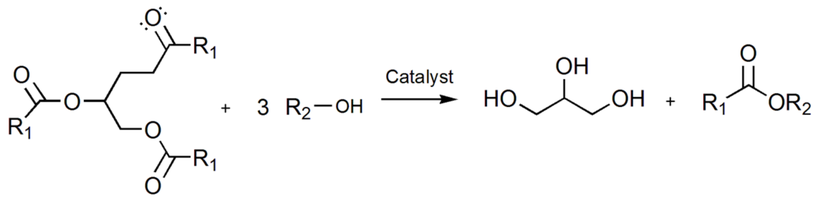


Biodiesel

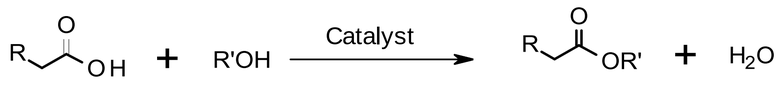
- Biodiesel, also referred to as Fatty Acids Methyl Esters (FAMEs).
- Obtained through renewable raw materials, as animal and vegetable oils and fats.
- Biodiesel can partially or completely replace petroleum diesel.

Production Methods

Transesterification - favorable reaction to obtain fuel from triglycerides.



Esterification is an option for the conversion of free fatty acids (FFA) present in oils, in esters of fatty acids.



In both reactions, the presence of **catalysts** for the production of biodiesel is required for an effective conversion.

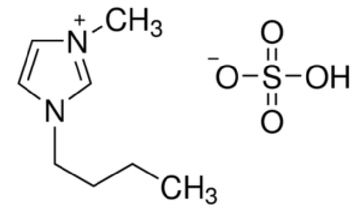
Catalysts

- Alkali catalysts are not capable of catalyzing the esterification reaction and may lead to the saponification reaction.
- Acid catalysts promote both transesterification and esterification reactions but are inefficient.

Ionic Liquids (I.L.)

- I.L. as a catalytic system are resulting in high conversions in biodiesel production.
- There is a possibility of designing a specific molecule according to its application with exceptional thermal and chemical stability, high catalytic activity and solvability, low toxicity.
- They have the ability to recycle and reuse.

Hydrogen sulfate 1-butyl-3-methylimidazolium [BMIM][HSO_4]



Literature Results

Imidazolium-based ionic liquids have been the most studied for biodiesel production, including hydrogen sulfate 1-butyl-3-methylimidazolium **[BMIM][HSO_4]**, which has been showing promising results.

Reaction	Feedstock	Molar Ratio alcohol/oil	Catalyst Dosage	Temp. (°C)	Reaction Time (h)	Conversion (%)	REF.
Transesterification	crude palm oil	12:1	4.4 wt%	160	2	91.2	Elsheikh et al. (2011)
Esterification	oleic acid	9:1	3.4 wt%	90	4	84.4	Fauzi and Amin (2012)
Esterification	oleic acid	9:1	0.06 mol	87	5.2	81.8 e 80.4[a]	Fauzi and Amin (2013)
Transesterification	Camptotheca acuminata seed oil	6:1	5 wt%	60	0.5	38.5	Li et al. (2014)
Esterif. / Trans.	palm oil	15:1	5 wt%	160	1	95.6[b]	Ullah et al. (2015)
Esterification	oleic acid	10:1	10 wt%	90	4	89.7	Alimova (2016)
Esterification	oleic acid	10:1	20 wt%	90	6	84.8	Tadevosyan (2017)

[a] 81,8% e 80,4% for methyl oleate yield and conversion of oleic acid;
[b] after esterification with LI and transesterification with KOH.

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