



Evaluation of methylic and ethylic biodiesels from Pequi oil (*Caryocar brasiliense* Camb.) as possible diesel substituents.

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INTRODUCTION

Motivating factors for this research:

fossil fuel burning → environmental problems (- Greenhouse effect - Acid rain - Damage to the ozone layer)

declining oil reserves → need for alternative energy sources

Biodiesel → a possible biosubstituent to diesel oil

Easiness to adapt biodiesel to diesel engines

Brazilian panorama:

94% of biodiesel production → soybean oil (74%) and animal fat (20%)

Actually: diesel presents 6% of biodiesel

Increase of biodiesel levels → only with diversification of raw materials

Pequi (*Caryocar brasiliense* Camb.) is a typical fruit of the Brazilian Cerrado.



http://pt.wikipedia.org/wiki/Pequi#mediaviewer/File:Frutopequi.JPG

Cerrado: located at various Brazilian States



http://www.sabordocerrado.com.br

main fatty acid constituents of Pequi oil:

oleic acid (47.3%)

palmitic acid (31.4%)

linoleic acid (15.6%)

stearic acid (2.2%)

vaccenic acid (1.7%)

palmitoleic acid (0.7%)

linolenic acid (0.7%)

myristic acid (0.1%)

arachidic acid (0.1%)

gondoic acid (0.1%)



OBJECTIVES

- ☺ Synthesis of methylic and ethylic biodiesels from pequi oil
- ☺ Transesterification reaction via alkaline homogeneous catalysis
- ☺ investigate the thermal decomposition kinetics of these biodiesels.



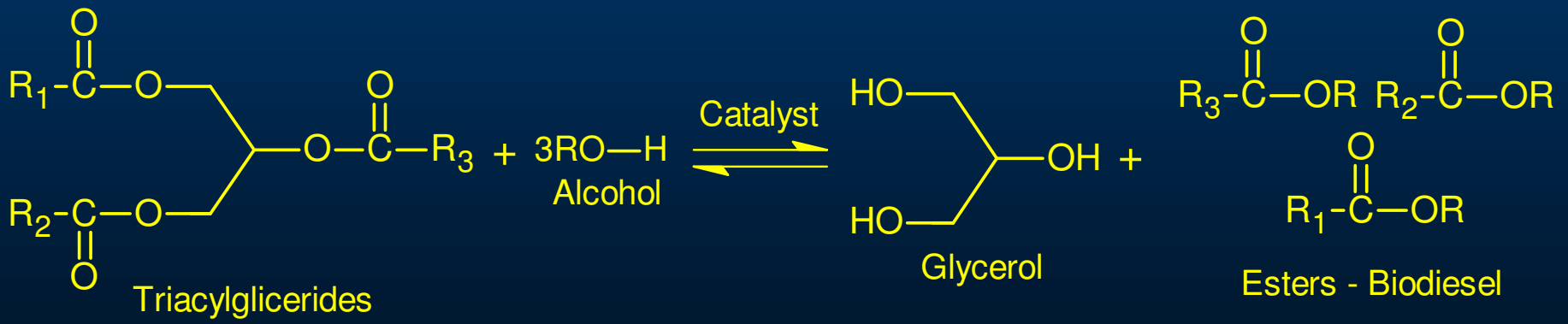
EXPERIMENTAL

Biodiesel production

6:1 alcohol/oil molar ratio

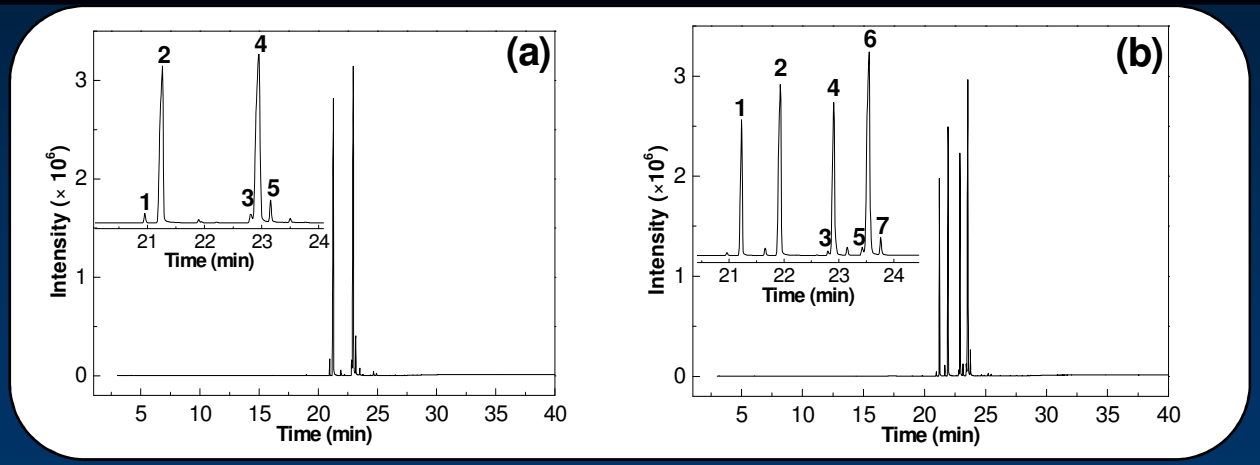
catalyst concentration of 1% w/w

General transesterification reaction scheme





RESULTS



Peak	MBP		EBP	
	T_r (min)	Compound	T_r (min)	Compound
1	20.946	methyl palmitoleate	21.233	methyl palmitate
2	21.292	methyl palmitate	21.933	ethyl palmitate
3	22.808	methyl linoleate	22.792	methyl linoleate
4	22.975	methyl oleate	22.917	methyl oleate
5	23.142	methyl esthereate	23.425	ethyl linoleate
6	---	---	23.550	ethyl oleate
7	---	---	23.783	ethyl Esthereate

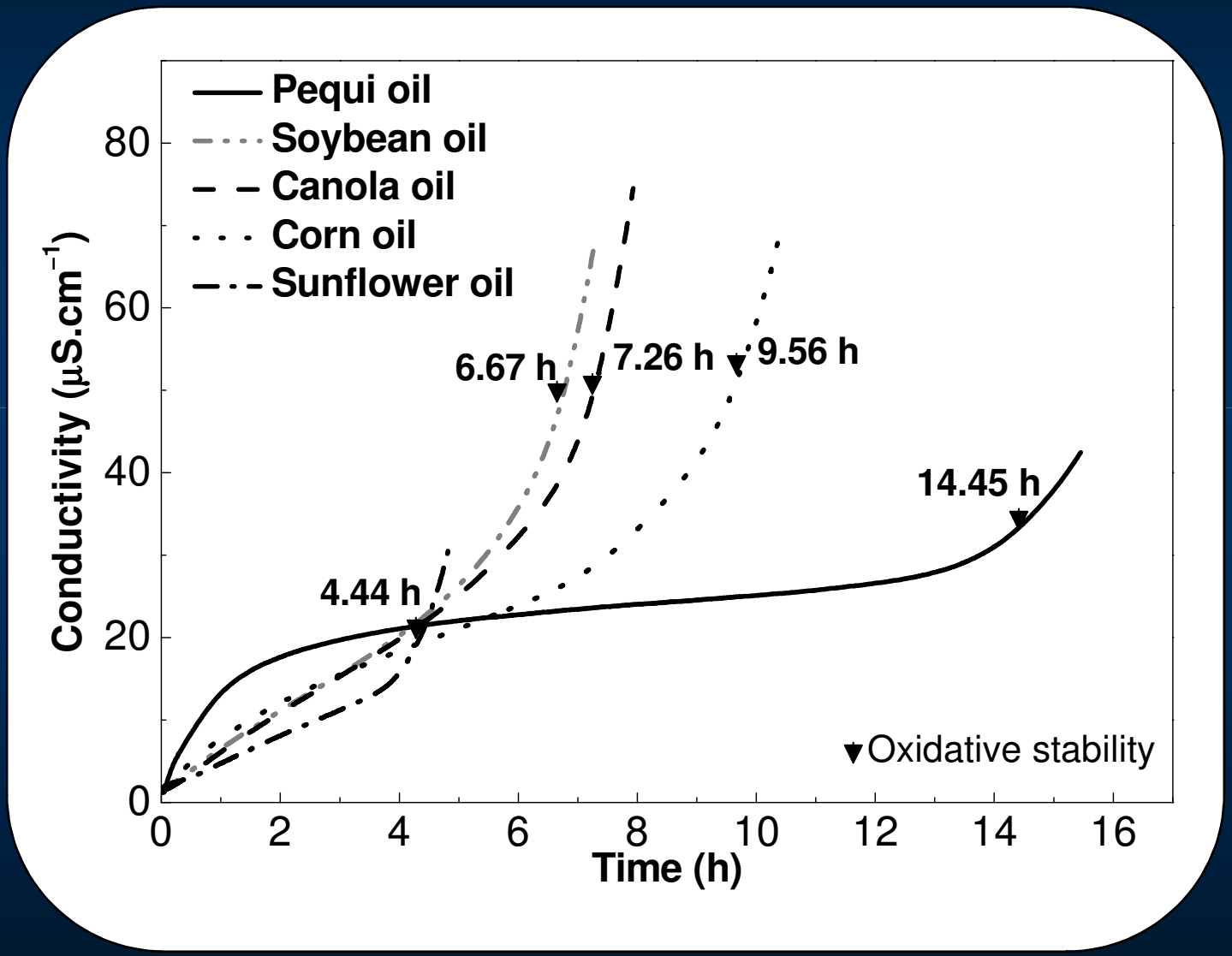
After proper steps of neutralization and drying :

Route	Yield (%)	
	Crude biodiesel	Refined biodiesel
Methylic	96 ± 1	74 ± 4
Ethylic	80 ± 1	57 ± 2

Physico-chemical properties

Property	Unity	Pequi oil	MPB	EBP	Brazil ANP – 07/2008	EU - EN 14214	EUA - ASTM D6751
Acidity Índex	mg of KOH/g	2.2 ± 0.1	0.47 ± 0.06	0.57 ± 0.05	0.50 max	0.50 max	0.50 max
Density, 20 ºC	kg m^{-3}	905.5 ± 0.7	869.69 ± 0.07	862.3 ± 0.3	850-900	---	---
Kinematic viscosity, 40 ºC	mm^2 s^{-1}	35 ± 1	4.27 ± 0.03	4.54 ± 0.02	3.0-6.0	3.5-5.0	1.9-6.0
Oxidative stability, 110 ºC	h	14.4 ± 0.3	4.5 ± 0.3	4.95 ± 0.05	6.0	6.0	3.0
Refractive index, 40 ºC	---	1.4652 ± 0.0002	1.4463 ± 0.0005	1.4403 ± 0.0004	---	---	--

Pequi oil thermal stability:





CONCLUSIONS

Pequi oil: feasible raw material to obtain methylic and ethylic biodiesels.

These biodiesels constitute potential substituents for mineral diesel fuel.

Complementary information:.

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Methylic and ethylic biodiesels from pequi oil (*Caryocar brasiliense* Camb.): Production and thermogravimetric studies

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Pequi oil

Transesterification

Pequi biodiesel

- ✓ Good properties
- ✓ Thermal stability

Thank you

