LIPASE FROM *Ricinus communis* SEEDS AS BIOCATALYST IN THE ESTERIFICATION OF PALMITIC ACID.

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Introduction. Lipases are enzymes that catalyze the hydrolysis of triacylglycerides. They are found in microorganisms, animals and plants. They can also catalyze reactions such as esterification, transterificación, alcoholysis, acidolysis and aminolysis.[1] Among plants lipases, we can find those from of *Ricinus communis* seeds, this plant grows wild in several kind of climates. Previous studies have demonstrated its hydrolytic capacity,[2] but its potential to catalyze other reactions is unknown.

Due to the abundance of *R. communis*, and because it does not have commercial value and does not require special care, we believe that the lipase contained in its seeds and supported on its natural matrix can biocatalysis esterification reactions. This work presents the results in the esterification of palmitic acid with several alcohols catalyzed by lipase from *R. communis*.

Methods. The endocarp of the seeds was removed and the oil was extracted by maceration with acetone to obtain powders,[3] which contain lipase, these powders were treated with buffer. Hydrolysis[4] test were performed to confirm the enzyme activity. The esterification reactions were carried out with palmitic acid using different alcohols and solvents, reaction condition were 20% of powders at 40 °C and stirred by 48 h.[5]

Results. The enzyme activity was assayed by hydrolysis of commercial oil using powders, treated with buffer and powders without buffer treatment, getting more conversion with the enzyme without treatment (74%) within 24 h. However, when both enzymes preparations were tested in the esterification, only treated enzyme was capable of catalyzing the esterification. Initially palmitic acid was esterified with 1-butanol in isooctane, and the conversions reached 77% at 48 h. We tested various solvents being hexane and isooctane the best, the results are summarized in Tables 1 and 2.

Conclusions. These results show that lipase from *R. communis* prefers to esterify primary alcohols in moderated yield and also secondary which do not have steric problems, in the case of poliols they can be esterified if they are solubilized.

Table 1. Esterification of palmitic acid with 1-butanol in different solvents.

Solvent	**Result** (isolated yield, %)
Hexane	62
Isooctane	77
THF	17
Acetonitrile	10
1,4-Dioxane	7
DMF	No reaction
DMSO	No reaction
Ethy ether	5

Table 2. Esterification reactions of palmitic acid.[1]

Alcohol	(%) **Conversion with solvent**	(%) **Conversion without solvent**
Methanol	No reaction	3
Ethanol	3	15
1-Buthanol	77	39
2-Propanol	19	25
*iso*Butyl	40	31
2-Buthanol	15	27
*tert*Buthanol	50	No reaction
Benzyl	35	30
Phenol	No reaction	No reaction
Menthol	4	--
Glycerol*	55	No reaction
Cholesterol	60	--
Cetyl	50	--
Stearyl	50	--

* in THF; -- These alcohol are solids. [1]The yields were determinated by ^{1}H NMR.

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