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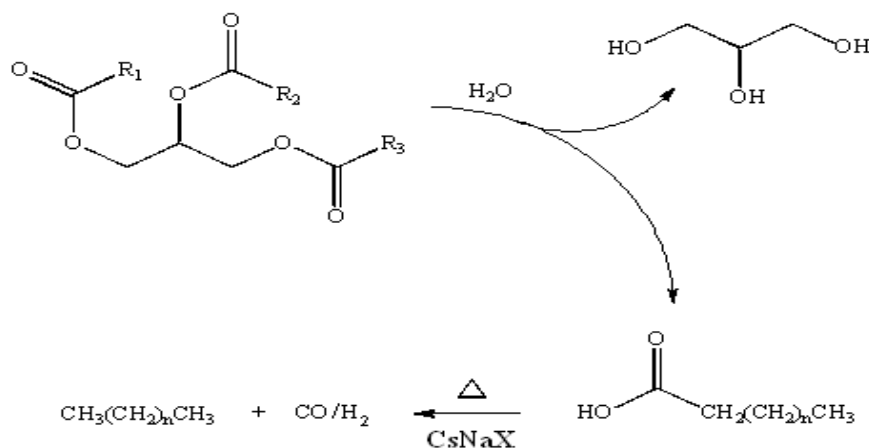
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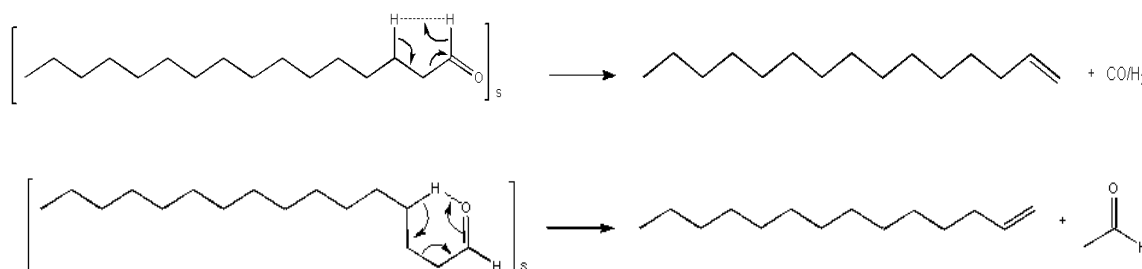
Catalytic decarbonylation of fatty acid over CsNaX for the production of long chain hydrocarbons

Conversion of vegetable oils and animal fats into diesel fuel has been widely investigated and developed. Nowadays, the term biodiesel is mainly associated with mono-alkyl esters of long chain fatty acids, since transesterification of triglyceride by methanol (methanolysis) to produce methyl esters of the straight chain fatty acid. Recently, methanolysis was found to proceed without catalyst using supercritical methanol. Although a fast kinetic can be obtained from methanolysis, the separation of methyl ester from glycerol becomes a major obstacle for this process. Moreover, several properties of methyl esters based fuels, such as higher viscosity and cloud point, and possible engine problems due to their higher acid number, as compared to that of conventional diesel fuels, limit their application in some areas.

Accordingly, diesel fuel without oxygenates is mostly preferred. In practice, oxygen-free diesel fuel can be derived from vegetable oils and animal fats. The novel technology involves simple hydrolysis of triglyceride into straight chain fatty acids, which can be further converted to long chain C_{16} - C_{18} hydrocarbons by effectively removal of the carboxylic group without breaking the hydrocarbon chain. The fatty acid formed by hydrolysis can be easily separated from glycerol and the latter process can be achieved either by decarbonylation over metal supported catalyst as shown;



Recently, it was found that low silica zeolite containing highly polarisable cation shows a relatively high activity for decarbonylation of polar compounds without use of hydrogen. Due to the highly polarizable nature of methyl ester, the interaction between carbonyl ester and the basic framework oxygen would readily weaken the carboxylic C-O bond, leading to the decomposition of the ester into formaldehyde and “aldehyde like species”. The formaldehyde formed would be partly evolved and some would decompose into carbonmonoxide and hydrogen, in a manner similar to methanol. In parallel, the long-chain aldehyde-like species can undergo decarbonylation to give carbonmonoxide and hydrocarbons.



In this study decarbonylation of fatty acids to produce long chain hydrocarbons was investigated. Palmitic, oleic and linoleic acid will be used as models since they are the major components found in triglyceride from vegetable oil. Low silica zeolites with highly polarisable cation are used for decarbonylation. Methanol are used as a co-reactant and hydrogen sources leads to the formation of fatty acid methyl ester such as methyl palmitate, methyl oleate, etc. These methyl esters became reactant for decarbonylation to hydrocarbon form over CsNaX catalyst.

