Ester interchange in oils + fats

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After the initial discovery of the thermally induce ester interchange reaction by Friedel & Crafts in 1865, this reaction has been widely used in industry including the modification of edible oils and oleochemistry. Several catalysts have been developed such as metal salts, metal oxides and alkaline catalysts such as sodium methoxide. The latter are used for the interesterification of triglycerides and their transesterification with methanol to produce biodiesel.

The mechanisms operating during a number of ester interchange reactions involving glycerides will be discussed. These mechanisms involve different catalytically active intermediates such as the methoxy anion, the enolate anion and the glycerolate anion. It will be shown that the concentration of various groups such as ester bonds and free hydroxyl groups in the reaction medium determine which of these intermediates dominates.

For the lipase catalysed interesterification, a novel mechanism leading to loss of specificity will be discussed. Processing aspects related to the mechanisms involved will be briefly reviewed.