

# Fats and Oils as Renewable Feedstock for Chemistry

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## Abstract

The encouragement of the environmentally sound and the sustainable use of renewable natural resources is an important aim of Agenda 21 on the way to a sustainable development.

Fats and oils are at present the most important renewable raw materials for the chemical industry, and it can be expected that their importance will steadily increase in the future. The question will be discussed which chemical reactions and processes have to be used and to be developed to enable the chemical industry to substitute petrochemical by renewable base chemicals. An important example is glycerol as a by-product of the biodiesel production. It is intriguing to follow the on-going substitution of production processes of base chemicals such as 1,2-propanediol, epichlorohydrin, and acrylic acid based on propene by new processes based on glycerol. The complete series of fatty diacids from adipic acid up to eicosanedioic acid and higher are available from unsaturated fatty acids **1-7** by oxidative scission of the double bond and microbial  $\omega$ -oxidation, by cross- and self-metathesis, by  $\omega$ -methoxycarbonylation, and combination of cross-metathesis and  $\omega$ -methoxycarbonylation, and by Kolbe electrolysis, respectively, in only one to three reaction steps.  $\omega$ -Amino -,  $\omega$ - hydroxy-, and  $\omega$ -unsaturated fatty acids can be obtained as well in very few reaction steps. Thus, a great variety of monomers for polyesters, polyamides and polyurethanes can be produced based on fats and oils and may substitute petrochemically derived monomers. Moreover, fatty acids **8-12** from special plant oils such as calendula, tung and vernonia oil offer fascinating opportunities for organic synthesis.