

Triglycerides – Fractionation

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This is the third of three related articles. The first described triglycerides, commonly called oils, the second described processing of the oils. This article will deal with the processes used to fractionate the methyl esters of the oils into discrete alkyl groups.

Methyl Esters

Triglycerides may be easily turned into methyl esters by reaction with methanol and catalyst. Base catalysts are preferred. As the reaction proceeds, the reaction mixture turns hazy as glycerin is liberated. Once complete, the excess methanol is distilled off, glycerin removed from the bottom after it settles and the methyl ester is distilled into its fractions.

The methyl ester formed by the reaction, if not distilled is still referred to by the oil name (for example methyl cocoate). However, once fractionated the material is named by carbon distribution. Methyl cocoate is fractionated into methyl laurate, methyl myristate and so on. The triglyceride source is lost in the name of the methyl ester. The names for the common alkyl groups are given below. Distillation is a major operation used to fractionate the methyl ester mixture gotten from oils into specific defined methyl esters having the desired alkyl groups.

Fatty Acids

The fatty acids are also available that have specific “cuts”. They include acids having a wide distribution, like coco fatty acid (having essentially the same distribution as the oil). They also include very specific cuts having a composition of a single fatty acid. One of the most confusing aspects of dealing with fatty acids is the nomenclature.

Commonly Used Fatty Acid Nomenclature¹

Designation	Name	Formula
<i>C6</i>	<i>Caproic acid</i>	<i>C₆H₁₂O₂</i>
<i>C8</i>	<i>Caprylic acid</i>	<i>C₈H₁₆O₂</i>
<i>C10</i>	<i>Capric acid</i>	<i>C₁₀H₂₀O₂</i>
<i>C12</i>	<i>Lauric acid</i>	<i>C₁₂H₂₄O₂</i>
<i>C12:1</i>	<i>Lauroleic acid</i>	<i>C₁₂H₂₂O₂</i>
<i>C14</i>	<i>Myristic acid</i>	<i>C₁₄H₂₈O₂</i>
<i>C14:1</i>	<i>Myristoleic acid</i>	<i>C₁₄H₂₆O₂</i>
<i>C16</i>	<i>Palmitic acid</i>	<i>C₁₆H₃₂O₂</i>
<i>C16:1</i>	<i>Palmitoleic acid</i>	<i>C₁₆H₃₀O₂</i>
<i>C18</i>	<i>Stearic acid</i>	<i>C₁₈H₃₆O₂</i>
<i>C18:1</i>	<i>Oleic acid</i>	<i>C₁₈H₃₄O₂</i>
<i>C18:2</i>	<i>Linoleic acid</i>	<i>C₁₈H₃₂O₂</i>
<i>C18:3</i>	<i>Linolenic acid</i>	<i>C₁₈H₃₀O₂</i>
<i>C20</i>	<i>Arachidic acid</i>	<i>C₂₀H₄₀O₂</i>
<i>C20:1</i>	<i>Gadoleic acid</i>	<i>C₂₀H₃₈O₂</i>
<i>C22</i>	<i>Behenic acid</i>	<i>C₂₂H₄₄O₂</i>
<i>C22:1</i>	<i>Erucic acid</i>	<i>C₂₂H₄₂O₂</i>
<i>C22:2</i>	<i>Clupanodinic acid</i>	<i>C₂₂H₄₀O₂</i>

<i>C24</i>	<i>Lignoceric acid</i>	<i>C₂₄H₄₈O₂</i>
<i>C26</i>	<i>Cerotic acid</i>	<i>C₂₆H₅₂O₂</i>
<i>C28</i>	<i>Montanic acid</i>	<i>C₂₈H₅₆O₂</i>
<i>C30</i>	<i>Myricic acid</i>	<i>C₃₀H₆₀O₂</i>
<i>C32</i>	<i>Lacceroic acid</i>	<i>C₃₂H₆₄O₂</i>
<i>C34</i>	<i>Geddic acid</i>	<i>C₃₄H₆₈O₂</i>

There are a wide range of products that are produced by utilizing the various fatty acids and methyl esters made using these processes.

Reference

1. O'Lenick, Anthony J., *Surfactants Chemistry and Properties* 1999, Allured Publishing Corporation p. 13-15.