



BMF 49 - 3-Monochloropropanediol esters (3-MCPD esters)

Over the last years, there has been an increase in interest for 3-MCPD fatty acid esters in food analysis. These esters are formed during production and heating of oils and fats, and are considered harmful at a high level of consumption.

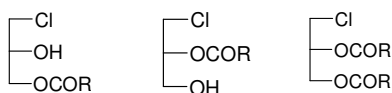
3-MCPD is a known carcinogen found as a heat-induced contaminant in many different types of fat-containing foodstuffs. The European Food Safety Authority (EFSA) has defined a limit of 2 µg/kg body weight as a tolerable daily intake (TDI).



However, in most foodstuffs only a small percentage of 3-MCPD is present as free 3-MCPD, most of it is ester-linked with fatty acids. The 3-MCPD fatty acid esters are assumed to be 100% metabolized to free 3-MCPD by a lipase-catalyzed hydrolysis. They are found to be present in all refined fats and oils, with the highest levels found in palm oil.

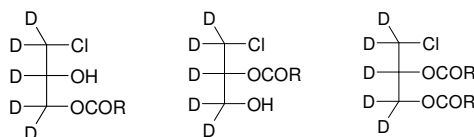
3-MCPD esters are a complex mixture of mono- and diesters linked with different fatty acids. The two different monoesters are often difficult to separate by GC or HPLC.

Types of 3-MCPD esters:



1-Monoesters 2-Monoesters 1,2-Diesters

Internal standards:

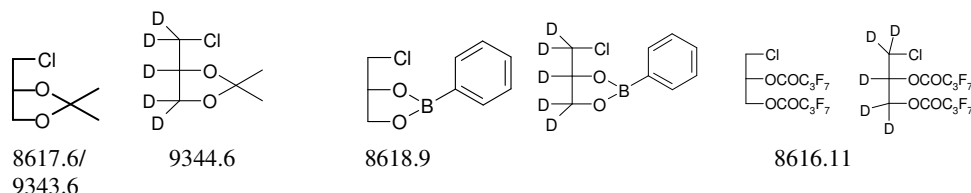


1-Monoesters 2-Monoesters 1,2-Diesters

R can be for example C₁₅ (Palmitate), C₁₇ (Stearate), C₂₁ (Behenate), etc.

Chiron AS now offers highly purified 1-mono- and diesters, both native and deuterated, for analytical work and for toxicological studies, as well as free 3-MCPD.

Analysis of intact individual 3-MCPD esters can be performed by HPLC or GC/MS. An alternative is to determine the total amount of 3-MCPD, the underlying alcohol-component of all 3-MCPD esters. Volatile derivatives for analysis by GC/MS can be achieved by saponification of the ester followed by reaction of the resulting alcohol with acetone, phenylboronic acid, or heptafluorobutyrylimidazole (HFBI). The internal standards can be derivatized in the same manner:



Acetone derivative

Phenylboronic acid derivative

HFBI derivative

Derivatization with phenylboronic acid is the most commonly used procedure, and is used in a number of official methods for determination of free 3-MCPD. Please inquire if you are interested in this derivatives.

Now available from Chiron AS:

Chiron No.	Product	Description
	Monochloropropanediols	
10030.3-K-ME	2-Chloro-1,2-propanediol	2-MCPD
3873.3-K-ME	3-Chloro-1,2-propanediol	3-MCPD
8607.3-K-ME	(R)-(-)-3-Chloro-1,2-propanediol	(R)-3-MCPD
8608.3-K-ME	(S)-(+)-3-Chloro-1,2-propanediol	(S)-3-MCPD
3874.3-K-ME	3-Chloro-1,2-propane-d5-diol	3-MCPD-d5

Available from Chiron as 1000µg/mL solution (1mL) in methanol.

Chiron No.	Product	Description
	3-MCPD-1-monoesters	
8949.19-100-ME	3-Chloro-1,2-propandiol-1-monopalmitate	3-MCPD-1-16:0
8950.19-100-ME	3-Chloro-1,2-propandiol-1-monopalmitoleate	3-MCPD-1-16:1 (9-cis)
8951.21-100-ME	3-Chloro-1,2-propandiol-1-monostearate	3-MCPD-1-18:0
8952.21-100-ME	3-Chloro-1,2-propandiol-1-monooleate	3-MCPD-1-18:1 (9-cis)
8953.21-100-ME	3-Chloro-1,2-propandiol-1-monolinoleate	3-MCPD-1-18:2 (9,12-dicis)
8954.23-100-ME	3-Chloro-1,2-propandiol-1-monoarachidate	3-MCPD-1-20:0
8955.23-100-ME	3-Chloro-1,2-propandiol-1-monogadolenate	3-MCPD-1-20:1 (11-cis)
8956.25-100-ME	3-Chloro-1,2-propandiol-1-monobenenate	3-MCPD-1-22:0
8957.25-100-ME	3-Chloro-1,2-propandiol-1-monoerucidate	3-MCPD-1-22:1 (13-cis)
	3-MCPD-diesters	
8967.35-100-ME	3-Chloro-1,2-propandiol-dipalmitate	3-MCPD-di16:0
8968.35-100-ME	3-Chloro-1,2-propandiol-dimonopalmitoleate	3-MCPD-di16:1
8969.39-100-ME	3-Chloro-1,2-propandiol-distearate	3-MCPD-di18:0
8970.39-100-ME	3-Chloro-1,2-propandiol-dioleate	3-MCPD-di18:1
8971.39-100-ME	3-Chloro-1,2-propandiol-dilinoleate	3-MCPD-di18:2
8972.43-100-ME	3-Chloro-1,2-propandiol-diarachidate	3-MCPD-di20:0
8973.43-100-ME	3-Chloro-1,2-propandiol-digadolenate	3-MCPD-di20:1
8974.47-100-ME	3-Chloro-1,2-propandiol-dibenenate	3-MCPD-di22:0
8975.47-100-ME	3-Chloro-1,2-propandiol-dierucidate	3-MCPD-di22:1
	Labelled MCPD-esters	
8981.19-100-ME	3-Chloro-1,2-propandiol-monopalmitate-d5	3-MCPD-1-16:0-d5
8976.21-100-ME	3-Chloro-1,2-propandiol-1-monostearate-d5	3-MCPD-1-18:0-d5
8977.25-100-ME	3-Chloro-1,2-propandiol-1-monobenenate-d5	3-MCPD-1-22:0-d5
8982.35-100-ME	3-Chloro-1,2-propandiol-dipalmitate-d5	3-MCPD-di16:0-d5
8978.39-100-ME	3-Chloro-1,2-propandiol-distearate-d5	3-MCPD-di18:0-d5
8979.47-100-ME	3-Chloro-1,2-propandiol-dibenenate-d5	3-MCPD-di22:0-d5

Available from Chiron as 100 µg/mL solution (1mL) in methanol

Soon available: 2-MCPD-monoesters and mixed 3-MCPD esters - Please inquire!

Literature: <http://www.efsa.europa.eu/en/efsajournal/pub/1048.htm>

Eur. J. Lipid Sci. Technol. 2011, 113, 277-278 and 304-308; Czech J. Food Sci., 2009, 27, 417-420

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