

# Sunscreen agents

## BMF 73 - SUNSCREEN AGENTS

### Why using sunscreen?

Sunscreen agents protect us from UV radiation and can be effective in preventing acute sunburns, skin cancer and skin aging. The European Commission states in MEMO/07/282 09/07/2007 that sunscreen agents should not be the only protection against UV radiation due to several reasons. Especially children should be protected by cloth, hats and other source of shades. It's mandatory to use sunscreen agents which provides protection against UVB (280-320 nm) and UVA (320-400 nm) radiation. UVA radiation is especially responsible for skin aging, UVB radiation for skin cancer and sunburn.

There are two types of sunscreen ingredients: inorganic so-called physical blockers and organic, chemical blockers. Inorganic components - mainly titanium dioxide and zinc oxide - reflect and scatter light over a broad spectrum. Organic sunscreen ingredients filter UVB and/or UVA radiation by absorption. Thereby light energy is converted into heat energy. Commonly used UVB filters are *p*-aminobenzoic acid (PABA), padimate O, cinnamates, salicylates, and octocrylene. UVA filters are mainly benzophenones, avobenzene and other. Usually, UVA and UVB active organic substances are combined in recent times because single use would not provide full protection.<sup>2</sup>



### Controversy

Although sunscreen agents are used more and more in the last decades there is also an increase in skin cancer observed. Possible relationships between these incidences are discussed. Some of the frequently-used organic sunscreen components are suspected to be carcinogenic or have other health risks. To evaluate these assumptions photochemistry of UV filters under the skin must be fully understood. Photobiological reactions are known to be induced by reactive oxygen species (ROS) like singlet oxygen or superoxide radical anion. A small number of studies regarding photochemistry of sunscreen components are known. Photochemical reactions will be of concern as soon as the UV filters penetrate through the stratum corneum, the outermost layer of the epidermis. Yet it is known that such permeation can occur; e.g. oxybenzone, octylmethoxycinnamate, and octylsalicylate were found in urine, breast milk and inner epidermis, respectively.<sup>3</sup>

Several studies suggest that some sunscreen ingredients like padimate O, octinoxate, homosalate, and oxybenzone show estrogenic activity. This effect was mainly seen if combinations of them have been used in sunscreen. It is mandatory to look deeper into this potential health risk to guarantee long-term safety of sunscreen.<sup>2</sup>

### Regulations in the US and Europe

No regulations are valid in the US or Europe until now regarding aforementioned compounds, although health concerns are discussed. The current predominant opinion of authorities and public is that concerns about potential health risks of long-term use of sunscreen are compensated by the benefits of sunscreen in terms of preventing sunburns, skin cancer and skin aging caused by UV radiation in the atmosphere.

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### Available from Chiron AS

Chiron is happy to offer a variety of sunscreen ingredients including internal standards. Native reference materials are available as neat material. Internal standard are available as a solution in methanol. Please enquire for more information and prices.

Pr. No.	Name	Synonym	CAS No.
	<b>Sunsceen agents</b>		
10222.8	2-Phenoxy-1-ethanol		122-99-6
10231.13	2-Phenylbenzimidazole-5-sulfonic acid	PBI	27503-81-7
10232.14	2-Hydroxy-4-methoxybenzophenone	Oxybenzone	131-57-7
10233.24	Diethylamino hydroxybenzoyl hexylbenzoate	Uvinul A Plus	302776-68-7
10234.38	2,2'-[6-(4-Methoxyphenyl)-1,3,5-triazine-2,4-diyl]bis[5-[(2-ethylhexyl)oxy]phenol	Bemotrizinol	187393-00-6
10235.24	Octocrylene	Uvinul N 539 T	6197-30-4
10236.17	2-Ethylhexyl- <i>p</i> -dimethyl amino benzoate	Padimate O	21245-02-3
10237.18	Octyl methoxycinnamate	Uvinul MC 80	5466-77-3
10238.20	Butyl methoxydibenzoyl-methane	Avobenzone	70356-09-1
10239.15	2-Ethylhexyl salicylate	Octisalate	118-60-5
10240.41	2,2'-Methylenebis(6-(benzotriazol-2-yl)-4- <i>tert</i> -octylphenol		103597-45-1
10241.16	Homosalate		118-56-9
10242.14	2-Hydroxy-4-methoxybenzophenone-5-sulfonic acid hydrate (contains 5-10% isopropyl alcohol)	Sulisobenzone, Uvinul MS 40	4065-45-6
10243.7	<i>p</i> -Aminobenzoic acid		150-13-0
10244.15	Isopentyl 4-methoxycinnamate		71617-10-2
10245.18	3-(4'-Methylbenzylidene)camphor		38102-62-4
10247.48	Octyl triazone	Uvinul T 150	88122-99-0
10248.13	2,4-Dihydroxybenzophenone	Uvinul 3000, Uvinul 400, Uvinul M 400	131-56-6
10250.30	2-(2 <i>H</i> -Benzotriazol-2-yl)-4,6-bis(1-methyl-1-phenylethyl)phenol	Benzotriazole BT, Uvinul 3034	70321-86-7
10251.17	2-(5-Chloro-2-benzotriazolyl)-6- <i>tert</i> -butyl- <i>p</i> -cresol	Bumetriazole, Uvinul 3026	3896-11-5
10269.14	Dioxybenzone		131-53-3
	<b>Sunscreen Internal Standards</b>		
10249.13	2,4-Dihydroxybenzophenone- <sup>13</sup> C <sub>6</sub>	Uvinul 3000, Uvinul 400, Uvinul M 400	131-56-6 (unlabelled)

Please note: All details are without guarantee.

<sup>1</sup>European Commission - MEMO/07/282 09/07/2007.

<sup>2</sup>D. R. Sambandan, D. Ratner *J Am. Acad. Dermatol.* 2011, 64 (4), 748-749.

<sup>3</sup>K. M. Hanson et al. *Free Rad. Bio. & Medicine* 2006, 41, 1205-1212.