



**BASF**  
We create chemistry

Care  
Creations™

EcoSun Pass®:

자외선 차단제품의 환경영향 평가 도구

Personal Care Solutions, BASF



For the Ethical – Sustainable claim,  
shall consider impacts on coral

# Limitation of UV Filter choice in some market driven by environmental aspects

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- **United States: Hawaii, Key West Florida and Virgin Islands**
  - ✓ Ban of Benzophenone-3, Ethylhexyl Methoxycinnamate
- **Palau**
  - ✓ Ban of Benzophenone-3, Ethylhexyl Methoxycinnamate, Octocrylene, 4-Methylbenzylidene Camphor
- **Brazil**
  - ✓ Ban of Benzophenone-3, Ethylhexyl Methoxycinnamate, Octocrylene, 4-Methylbenzylidene Camphor under discussion
- **Thailand - National parks**
  - ✓ Ban of Benzophenone-3, Ethylhexyl Methoxycinnamate, 4-Methylbenzylidene Camphor

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**Reduction of choice of UV filters = limitation in regard of sensory & cost in use**

# Coral reef real issues



해양 투기



지구 온난화

(sea temperature (coral disease + migrated fish population...), irradiance intensity)



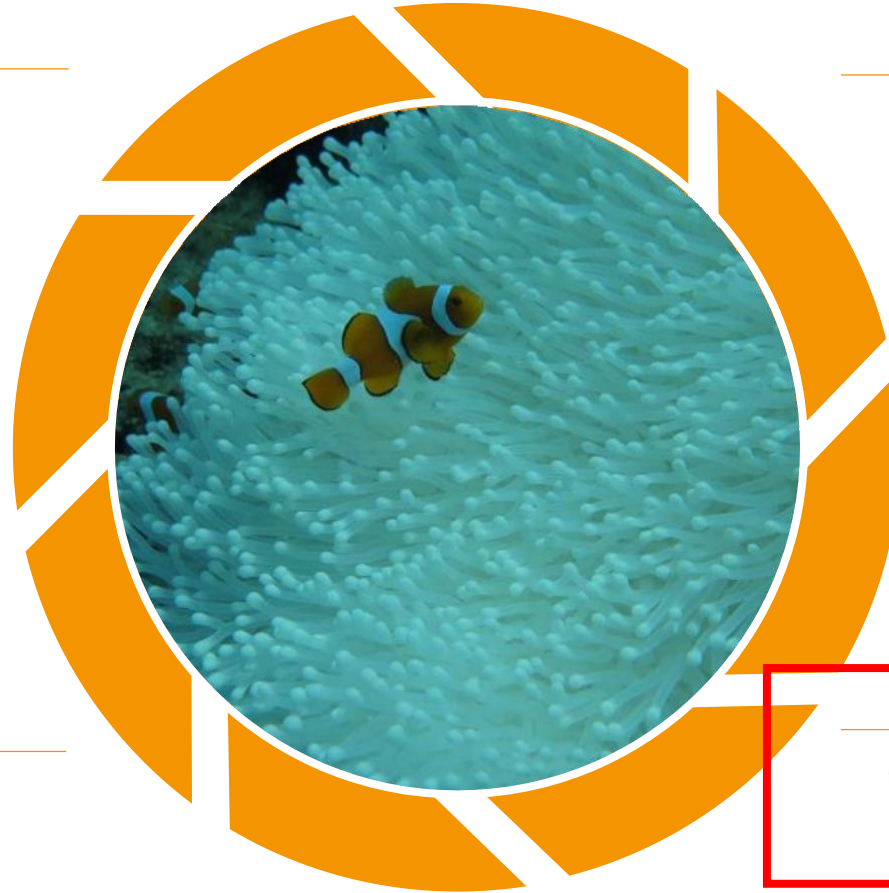
대양 산성화

(increase in atmospheric CO<sub>2</sub>, decreasing ocean pH)



대기 오염

(volcanic eruption)



생태계 내 경쟁  
(with algal coverage)



천적류  
(starfish "Acanthaster" population growth)



어구 폐기물

(cyanide, dynamite, grill nets, fish traps, anchors)



해양 오염  
(agro nutrient cause eutrophication → disease)



# For the Ethical – Sustainable claim, EcoSun Pass<sup>®</sup> can be the solution

## What is the EcoSun Pass<sup>®</sup>

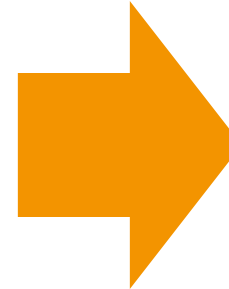
- Sun 제품에 포함된 UV Filter의 환경 영향을 평가하는 과학적인 도구\*
- UV Filter의 환경영향을 그 효능과 함께 다각도로 평가하는 도구
- 따라서, 보다 친환경적인 UV Filter 후보군을 제품 개발 시작단계에서 설계할 수 있음
- 유기/무기UV Filter모두 평가 가능함
- 평가 결과는 “EcoSun Pass (ESP) value” 로 통칭
- 제형의 ESP 값이 200 이상이면 친환경으로 간주할 수 있음
- 현재, 유럽 시장에서 상위 10% 선제품만이 ESP 값이 200 이상을 나타냄
- \*Sunscreens typically contain a combination of 4 to 6 UV filters („formulation“) in order to have a full UV-A and B protection at medium, high and very high Sun Protection Factors (SPF 30, 50 and >50)

# Environmental effect of UV filters

Different parameters are evaluated to define their environmental footprint



- 생분해성
- 급성수생독성
- 만성수생독성
- 생물 농축성
- 육생생물 독성
- 미생물/활성슬러지 영향



## Data basis

- 연구보고서
- ECHA-website
- 관련문헌
- QSAR (quantitative structure-activity relationship models)
- 전문가 집단 평가



Acknowledged by  
Pierre Potier Award

환경 영향과 관련된 요소들을 함께 종합적으로 평가해야 정확한 분석이 가능하고, 보다 친환경적인 선케어 제형 개발이 가능

# Cut-Off Criteria used for EcoSun Pass®

Cut-off criteria may be used to exclude potentially harmful component from being formulated into Sunscreen.

내분비 교란*	수생독성	생물농축성 및 독성
Proven to be an Endocrine Disruptor according to the WHO definition*	Acute Aquatic Toxicity EC/LC50 < 0.1 mg/L	Confirmed as vPvB (Very Persistent / Very Bioaccumulative) according to ECHA criteria**
	Chronic Aquatic Toxicity NOEC/EC10 < 0.01 mg/L	Confirmed as PBT (Persistent/Bioaccumulative/Toxic) according to ECHA criteria**

위의 기준 중 하나라도 해당되는 자외선 차단제는 환경에 심각한 악영향을 끼칠 수 있으므로, 추가적인 환경영향평가가 불필요하고, 친환경 자외선 차단제에 부적합한 것으로 판정함.

\*Bergman, A., Heindel, J.J., S., J., Kidd, K.A. and Zoeller, R.T. State of the science of endocrine disrupting chemicals 2012. World Health Organisation (WHO), Geneva, Switzerland, (2012).

\*\*ECHA 2017: Guidance on Information Requirements and Chemical Safety Assessment, Chapter R.11: PBT/vPvB assessment, Version 3.0, June 2017, 158 p

**EcoSun Pass® 알고리즘에 따르면, 위 3가지 기준 중 하나라도 해당되는 UV Filter를 포함하는 선제형은 ESP값이 0으로 산출됨**

# UV Filters with negative effects in one of the critical parameters

## 결정적인 부적합 요소를 가지고 있는 UV Filter

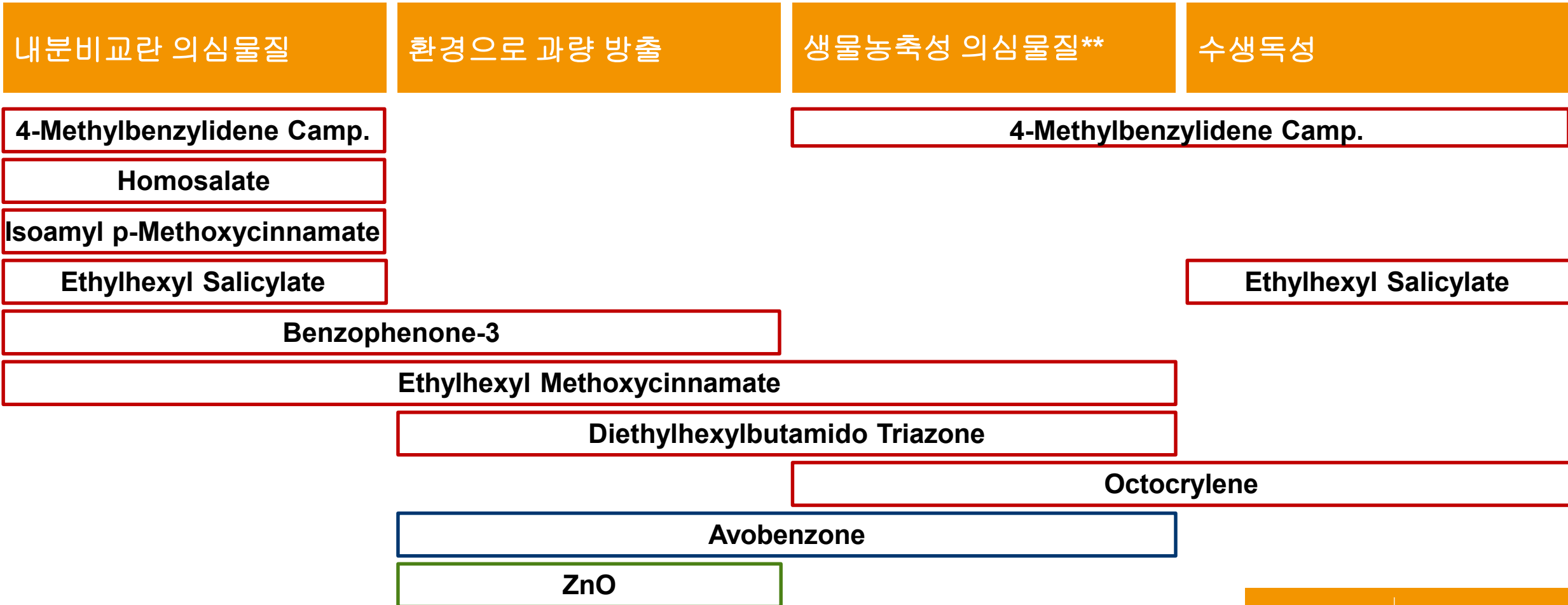
UV Filter	cut-off" 판정 항목	GLP Labelling / Comments	Status
Octocrylene (OCR)	만성 수생 독성	C1 (EC10/NOEC <0,01 >0.001 mg/L) = T confirmed	확정
4-Methylbenzylidene camphor (MBC)	내분비교란 의심물질, 생물 농축성, 급성 및 만성 수생 독성	A1 (EC50 <1 >0,1mg/L) C1 (EC10/NOEC <0,1 >0,01mg/L) but no "T" labelling (A:EC50<0,1mg/L & C:EC10/NOEC<0,01mg/L)	ED Confirmed
<b>From Q4 2022 on</b> Ethyl Hexyl Salicylate (EHS)	만성 수생 독성	C1 (EC10/NOEC <0,01 >0.001 mg/L) = T confirmed	확정



# Environmental effect of UV filters

UVB/UVAII Filter
UVA Filter
Broad Spectrum Filter

## 환경 이슈가 있는 UV Filter\*



\*On Community Rolling Action Plan by European Chemical Agency and EFfCI by REACH  
 \*\*Persistent, Bioaccumulative and Toxic / very Persistent and very Bioaccumulative

# BASF Sunscreen Simulator

## ==== 최초의 Sunscreen Simulator로서 모델이 됨

- 20년간 사용되며 검증된 tool
- Simulation model에서 여러차례의 upgrade를 거침

## ==== Sunscreen의 효능을 알아볼수 있는 가상실험실

- 기본기능: SPF SPF, UVA 차단효과, 광안정성
- 추가기능 업데이트됨

## ==== 시뮬레이션 = 선제품 신제품 연구에서 초기방향 설정에 유용함

- 가성비가 우수한 자외선 차단제 조성 설계
- 시뮬레이션에 제한이 없음
- 실시간 결과확인이 가능한 사용환경
- 여러개의 조성을 한눈에 비교실험 가능

## ==== 시뮬레이션 = 자외선차단제 조성의 최적화 & 비용 최적화



Your  
Digital Lab

# Sunscreen Simulator 2.0

[https://sunscreensimulator.basf.com/Sunscreen Simulator/](https://sunscreensimulator.basf.com/Sunscreen_Simulator/)

Go to Solubility Calculator

Once you input UV filter compositions to the simulator,

test 1 test 2 test 3


**FILTER SELECTION**

	Max.	test 1	test 2	test 3
- BEMT	10%	3.00%	3.00%	3
- DHHB	10%	2.00%	2.00%	2
- EHS	10%	0.00%	0.00%	1
- EHT	5%	2.00%	2.00%	2
- OCR	10%	0.00%	3.00%	0
Total:		7.00%	10.00%	8.00%

**SPF (SUN PROTECTION FACTOR)**

SPF:	16.9	21.3	17.9
Rating:	15	20	15
Filter Efficiency:	2.41	2.13	2.24

**ECOSUN PASS VALUE**

EcoSun Pass Value	202	0	194
Rating:		-	-

**UVA-METRICS**  
**BLUE LIGHT PROTECTION**

**FILTER**

Region\* Application amount Show

All filters 2 mg/cm<sup>2</sup> INCI-Name

\* Please select the relevant region for your calculation

**BROAD-SPECTRUM / UVA I FILTERS**

INCI-Name

- Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine (**Tinosorb® S**)
- + Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine aq, active amount (**Tinosorb® S Lite Aqua**)
- + Butyl Methoxydibenzoylmethane
- Diethylamino Hydroxybenzoyl Hexyl Benzoate (**Uvinul® A Plus**)
- + Disodium Phenyl Dibenzimidazole Tetrasulfonate
- + Drometrizole Trisiloxane
- + Menthyl Anthranilate
- + Methylene Bis-Benzotriazolyl Tetramethylbutylphenol (nano), active amount (**Tinosorb® M**)
- + Terephthalylidene Dicamphor Sulfonic Acid
- + Zinc Oxide (nano) oil or aq (**Z-Cote®**)
- + Zinc Oxide (nano) oil (**Z-Cote® HP1**)

**UVB / UVA II FILTERS**

# Calculation of EcoSun Pass<sup>®</sup>

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The EcoSun Pass<sup>®</sup> is calculated depending on:

- SPF & UVA-PF *in silico* value
- UV filter type used in formulation
- Quantity of UV filter used
  
- No consideration of other ingredients in a sunscreen formulation

# EcoSun Pass<sup>®</sup>

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The higher the value, the friendlier the UV composition for the environment



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**A comprehensive system to evaluate sun-screen products**

# EcoSun Pass Calculation

## SPF 50

(UV-DE-15-124-1-4)

10.0% Uvinul<sup>®</sup> MC80 (EHMC)  
 2.5% Uvinul<sup>®</sup> T150 (EHT)  
 5.0% EHS  
 8.0% Uvinul<sup>®</sup> A Plus (DHHB)  
 4.0% Tinosorb<sup>®</sup> M (2%MBBT)

## SPF 50

(UV-CN-17-CL103001)

10.0% Uvinul<sup>®</sup> MC80 (EHMC)  
 1.0% Uvinul<sup>®</sup> T150 (EHT)  
 3.0% Uvinul<sup>®</sup> A Plus (DHHB)  
 3.0% Tinosorb<sup>®</sup> S Lite Aqua  
 (0.6%BEMT)  
 11.0% Tinosorb<sup>®</sup> M (5.5%MBBT)

## SPF 50

(UV-DE-13-157-2-1)

4.0% Uvinul<sup>®</sup> T150 (EHT)  
 5.0% Uvinul<sup>®</sup> A Plus (DHHB)  
 11.0% Tinosorb<sup>®</sup> M (5.5%MBBT)  
 3.5% Tinosorb<sup>®</sup> S (BEMT)

## SPF 50

(UV-DE-15-124-7-3)

2.0% Uvinul<sup>®</sup> T150 (EHT)  
 8.0% Tinosorb<sup>®</sup> A2B (4% TBPT)  
 12.0% Tinosorb<sup>®</sup> M (6%MBBT)  
 2.5% Tinosorb<sup>®</sup> S (BEMT)

UV Filters  
concentration

27.5%

20.1%

18%

14.5%

SPF in vivo

54

54  
(SPF in silico)

54

57

UVA-PF in vitro

18.2

20.0

17.7

18.1

EcoSun Pass<sup>™</sup>  
Index

0

203



238



272



More Eco-friendly UV filters system is possible

# Environmental related claims | certificates | EcoSun Pass®



- SUPREME LIGHT TECHNOLOGY
- ECOSUN PASS® CERTIFIED
- HYPOALLERGENIC FORMULA
- CONSCIOUS PACKAGING



EcoSun Pass is either a registered trademark or a trademark of BASF SE in the European Union and/or other countries.



 **BASF**

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