

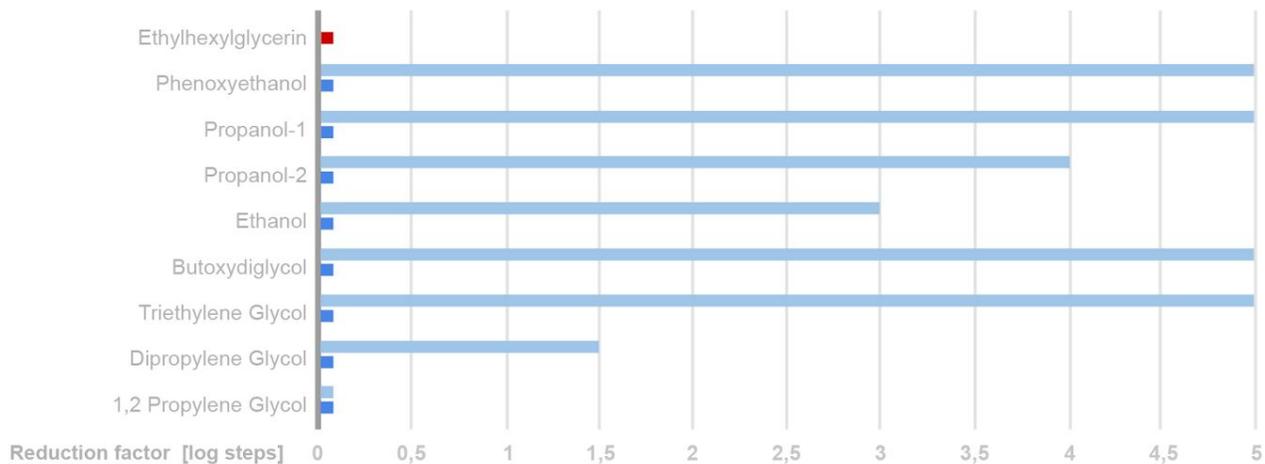
## sensiva® SC 50 – truly multifunctional!

The recent pandemic has focused the world's attention on antimicrobials. Prevention of contamination, both on skin and in product, has never been more important to manufacturers and consumers. This is familiar territory to schülke, which was founded in 1889 with a singular focus...to protect people and products worldwide against infection and microbial contamination.

While recent events have focused industry attention on antimicrobial actives, multifunctionals can be used to boost the efficacy of these materials, while adding other functionalities to a formulation. schülke's launch of sensiva® SC 50 (ethylhexylglycerin) in 1991 gave the personal care industry its first truly multifunctional additive, however, it wasn't until the early 2000's that the unique characteristics of this product started attracting the attention of formulators.

sensiva® SC 50 is widely known for its ability to boost the activity of preservatives and antimicrobial actives. Early studies combining this material with short chain alcohols and glycols proved this synergy, offering a new way to boost preservative efficacy in finished formulation.

### Test organism: *Pseudomonas aeruginosa*, contact time: 1 min.



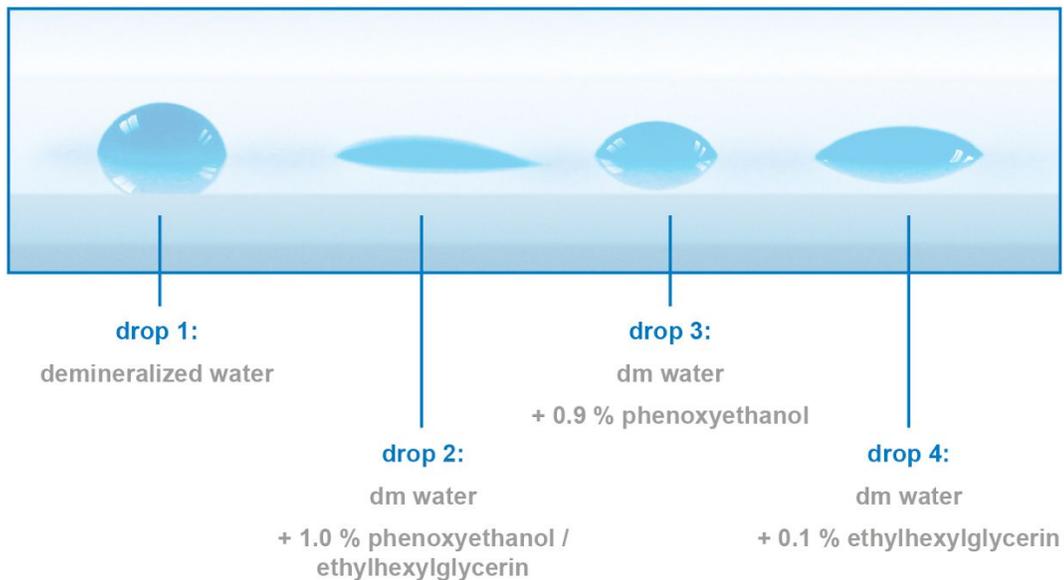
■ 1% Ethylhexylglycerin in water (\*) ■ 10% Alcohol in water ■ 10% Alcohol + 1% Ethylhexylglycerin in water

(\*) suspension

In their patent granted in 2005, Modak, Gaonkar and Sampath illustrate “synergistic combinations of octoxyglycerin (former INCI designation for ethylhexylglycerin) and at least one other antimicrobial agent in formulations which are more effective than prior art compositions without causing increased irritation to the skin of the average user”<sup>1</sup>. This technology is of particular interest today, as increased use of hand sanitizers by the general public has increased the prevalence of dry, irritated hands. As little as 1% sensiva® SC 50 incorporated into an alcohol-based hand sanitizer formulation can boost the antimicrobial efficacy, while improving the moisturization of the skin after use.

The surfactant structure of sensiva® SC 50 has been proposed to be one of the mechanisms that allows this material to boost preservative activity. As sensiva® SC 50 has been shown to significantly reduce surface tension, it has been theorized that this multifunctional additive reduces the interfacial tension on the membrane of microorganisms, allowing other antimicrobial materials to penetrate faster and more effectively.<sup>2</sup>

## Contact angles of aqueous solutions



## Theory – ethylhexylglycerin reduces interfacial tension on cell wall of organisms

This same surfactant characteristic may be the reason that sensiva® SC 50 has been shown to improve fragrance fixation on skin. A 2011 study by Schülke & Mayr GmbH, evaluating the effect of this material on fragrances, shows that sensiva® SC 50 has a boosting or fixating effect on many fragrance components, while producing a fresher or softer scent with others. This ability to bind certain oily substances to the skin might prove beneficial for other formulation components, such as organic sunscreens or lip stains.

Ingredient Name	Boosting	Fixating	Fresher Scent	Softer Scent
Cinnamyl Alcohol	X	X		
Aldehyde C-10 (Decanal)	X	X		
Aldehyde C-16 (Ethyl Methylphenylglycidate)	X	X		
Citral*			X	
Citronellal			X	
Hydroxycitronellal*		X		
Cinnamal*	X	X		
Musk Ketone	X	X		
Diphenyl Ether		X		
Citronellol*			X	
Linalool*			X	
Alpha-Terpineol	X	X		
Amyl Salicylate		X		
Anethole			X	
Benzyl Acetate				X
Isobornyl Acetate	X	X		
Linalyl Acetate				X
Linalyl Isobutyrate	X	X		X
Menthanyl Acetate				X
Methyl Anthranilate	X			
Caryophyllene	X	X		
Amande Amère	X	X		
Niaouli			X	
Patchouli Brun Huile Essence				X

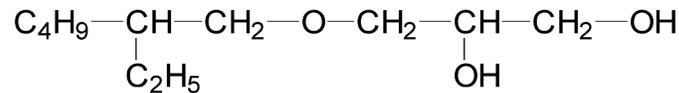
\* 76/768/EEC Article 6 (1) (g) substance

X = enhancement of the scent by sensiva® SC 50

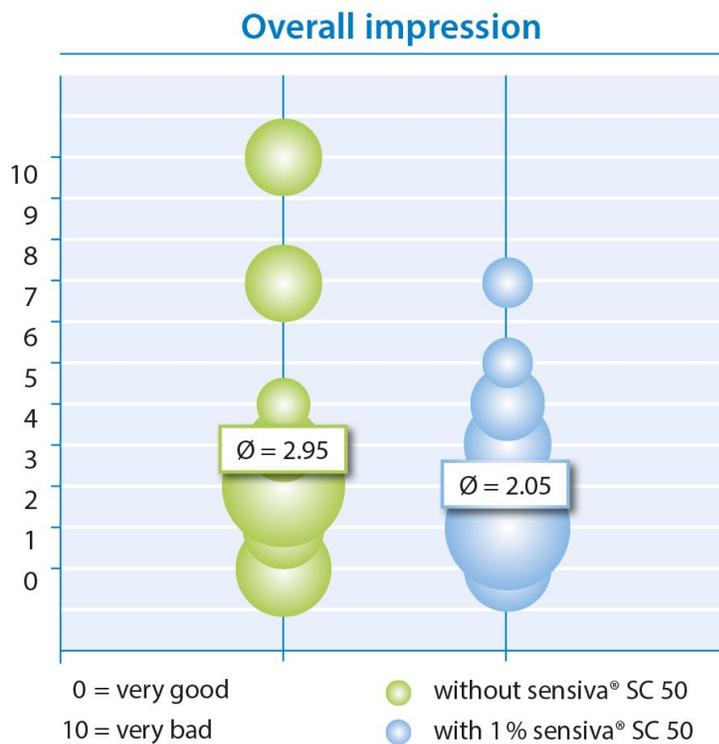
Boosting: enhancement of the scent after 1 hour

Fixating: enhancement of the scent after 6 - 24 hours

Examining the structure of sensiva® SC 50 more closely, points to it being a medium-spreading emollient:



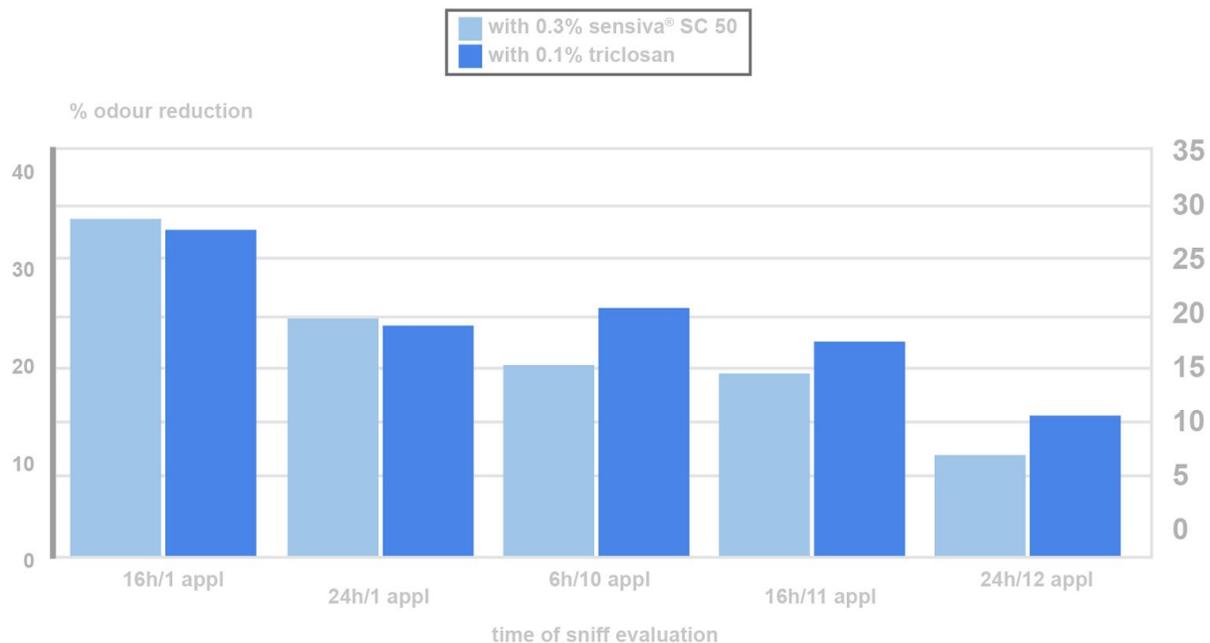
The ability of this material to improve the skin-feel of various personal care formulations was demonstrated in a 2010 Schülke & Mayr GmbH study.<sup>3</sup> In this study, a panel of trained subjects were asked to rate the feel of two cream formulas containing a high level of glycerin; one containing 1% sensiva® SC 50 and one with no sensiva® SC 50. The results showed the product containing the sensiva® SC 50 to feel less tacky and less greasy, with improved penetration and lower soaping. These results can be extrapolated to the use of sensiva® SC 50 to improve the feel of other formulation ingredients, such as certain sunscreen actives, known to cause tackiness.



- Ethylhexylglycerin improves the overall impression of a cream.
- Also tested:
  - reduced tackiness
  - increased speed of penetration
  - reduced soaping
  - reduced greasiness

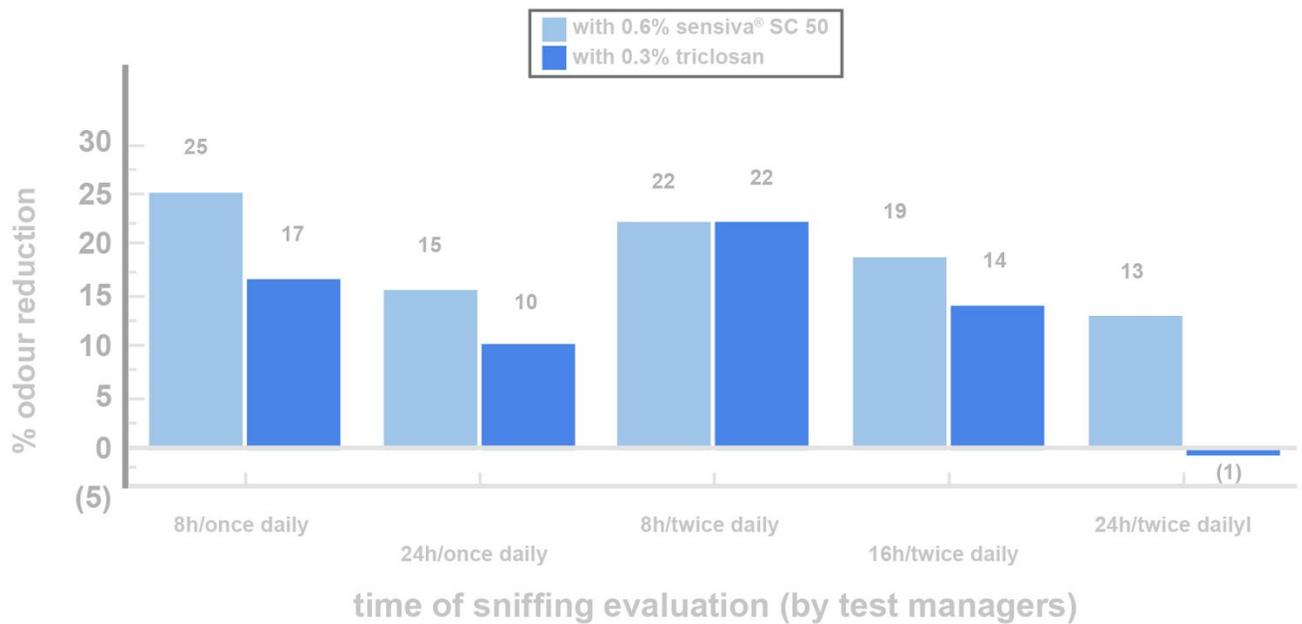
Further early studies into the efficacy of sensiva® SC 50 also support the use of this material as a substitute for triclosan in deodorant products. In a 1998 study, deodorant formulations containing sensiva® SC 50 were compared to ones containing triclosan. The formulations containing sensiva® SC 50 and triclosan showed statistically similar odor reduction in sniff tests on 20 volunteers. However, testing on several Gram-positive organisms commonly found in the axilla region, proved that sensiva® SC 50 has minimal effect on the microbiome as compared to triclosan, which indiscriminately eliminated all microorganisms, even at low concentrations. <sup>4</sup> In other testing, sensiva® SC 50 was shown to be effective against *Micrococcus sedentarius*, a common cause of foot odor.

## Results of the sniff test with sensiva® SC 50 in an alcohol-based deo formulation



**0.3% sensiva® SC 50 is as effective as 0.1% triclosan in an alcohol-based deo formulation**

## Evaluation of the sniff test with sensiva® SC 50 in a silicone-based, alcohol-free deo formulation



**0.6% sensiva® SC 50 is at least as effective as 0.3% Triclosan in a silicone-based, alcohol-free deo formulation**

Formulation	Microorganism	Concentration (Dilution)				
		50 %	25 %	12,5 %	6,25 %	3,12 %
<b>Deo A</b>	SX	-	-	-	-	-
0.1 % Triclosan	MK	-	-	-	-	-
1.0 % Propylene glycol	SE	-	-	-	-	-
40 % Ethanol	CC	-	-	-	-	-
58.9 % Water	CN	-	-	-	-	-
	CF	-	-	-	-	-
<b>Deo B</b>	SX	-	-	+	+	+
0.3 % sensiva® SC 50	MK	-	-	+	+	+
1.0 % Propylene glycol	SE	-	-	+	+	+
40 % Ethanol	CC	-	-	-	+	+
58.7 % Water	CN	-	-	+	+	+
	CF	-	-	-	+	+
<b>Deo C</b>	SX	-	-	+	+	+
	MK	-	+	+	+	+
1.0 % Propylene glycol	SE	-	-	+	+	+
40 % Ethanol	CC	-	-	+	+	+
59 % Water	CN	-	-	+	+	+
	CF	-	-	-	+	+
+ = growth / - = no growth						
SX = Staphylococcus xylosus 2		MK = Micrococcus kristinae				
SE = Staphylococcus epidermidis		CC = Corynebacterium callunae				
CN = Corynebacterium nephredii		CF = Corynebacterium flavescens				

sensiva® SC 50 is a well-researched multifunctional which has seen extensive use since its introduction in 1991. It has become the standard for boosting the activity of preservatives in personal care products, but many of its other benefits have been overlooked or are lost to time. Especially given our current reality, the many unique characteristics of sensiva® SC 50 deserve renewed attention. sensiva® SC 50 can improve the efficacy, skin-feel and moisturization of hand sanitizers, it can reduce tackiness in sun, haircare and lip care products, and it has been shown to be an effective, yet microbiome friendly deodorant.

sensiva® SC 50 is truly a multifunctional ingredient!

<sup>1</sup> Modak, Shanta, et al. Gentle-acting skin disinfectants. US 6846846-B2, Unites States Patent and Trademark Office, 25 January 2005

<sup>2</sup> Steinhauer, Katrin, et al. "Ethylhexylglycerin Impairs Membrane Integrity and Enhances the Lethal Effect of Phenoxyethanol." PLoS ONE 11(10) (2016)

<https://doi.org/10.1371/journal.pone.0165228>

<sup>3</sup> Leschke, Marion. "Ethylhexylglycerin for Improved Skin Feel." SQFW 8 (2010): 10-14

<sup>4</sup> Beilfuss, Wolfgang. "A Multifunctional Ingredient for Deodorants." SQFW 6 (1998): 2-6

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