

Development of preservative-free (additive-free) cosmetics using the
Mandom proprietary technique by exploiting the antibacterial properties of
“alkanediol” moisturizing ingredient

Mandom Corporation (HQ: Osaka City, Executive President and Representative Director: Motonobu Nishimura, hereinafter: Mandom) has established a proprietary technique for developing “preservative-free formulations” (formulations devoid of preservatives) by utilizing “alkanediols,” which are gentle skin moisturizing agents. Furthermore, Mandom has also recently acquired several patents in Japan and France for a technique involving the addition of alkanediol to cosmetic products.

The results from this study are scheduled to be presented at “The Joint Fall Symposium of the Society for Antibacterial and Antifungal Agents” (Mie University) on November 4, and at “The 57th Workshop of the Society of Cosmetic Chemists of Japan (SCCJ)” (The Tokyo Chamber of Commerce and Industry Hall) on November 25.

<Challenges facing transition to preservative-free cosmetics>

Parabens and other preservatives are added to cosmetics to prevent product deterioration from contamination after opening. However, users experience unpleasant skin reactions in the form of tingling sensation when using products containing preservatives, and in rare occasions, allergic reactions. Therefore, we have developed safer products for consumers with highly sensitive skin, and have continued to pursue research on developing “preservative-free” products. Based on our results, we have successfully developed “preservative-free” formulations by validating and utilizing the antibacterial properties of “alkanediols”, and have added to the cosmetics as moisturizing agents.

<What is alkanediol?>

Moisturizing agents such as pentylene glycol, hexanediol and caprylyl glycol commonly known as alkanediols, are a type of polyalcohol. Polyalcohols include glycerin and 1,3-butylene glycol. Given their hydrophilicity, they have been commonly used as moisturizing ingredients in cosmetics.

In addition, polyalcohols are known for their ability to minimize deterioration of the cosmetic like those ability of ethyl alcohol, though those effects are milder. It is difficult to completely prevent the deterioration of cosmetics solely using polyalcohols. Therefore, by studying the microbial control on deodorant products, we specifically focused on “alkanediols”, commonly used as moisturizing agents, and tested their effectiveness in preventing deterioration of cosmetics. Based on these results, we concluded that “alkanediols” are valuable in minimizing the deterioration of cosmetics.

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<Results of studying the antibacterial properties of alkanediols>

(1) Comparison of antibacterial effects of polyalcohols (including alkanediols) and preservatives

Cosmetics deterioration is caused by microbial growth. We measured the ability of alkanediols to inhibit microbial growth. Compared to other polyalcohols, alkanediols are superior chemicals with antimicrobial effects.

In particular, we confirmed that caprylyl glycols have preservative effects at low concentrations (0.1 to 0.3%), and similar to parabens, may be applied to a wide variety of preparations. This is very useful for the development of skin care products that are free of irritation. The table below shows the differences between caprylyl glycol and the conventional preservatives. Furthermore, pentylene glycol shows effects similar to caprylyl glycol at concentrations of about 3-5%, while hexanediol demonstrates similar effects at slightly higher concentrations of about 1-1.5%.

	Minimum inhibitory concentration (%) *						
	Polyalcohol				Preservative		
	Alkanediol			Glycerin	1,3-butylene glycol	Methyl parabens	Phenoxy ethanol
	Pentylene glycol	Hexanediol	Caprylyl glycol				
E. coli	2.7	1.4	0.2	32.7	11.7	0.2	0.5

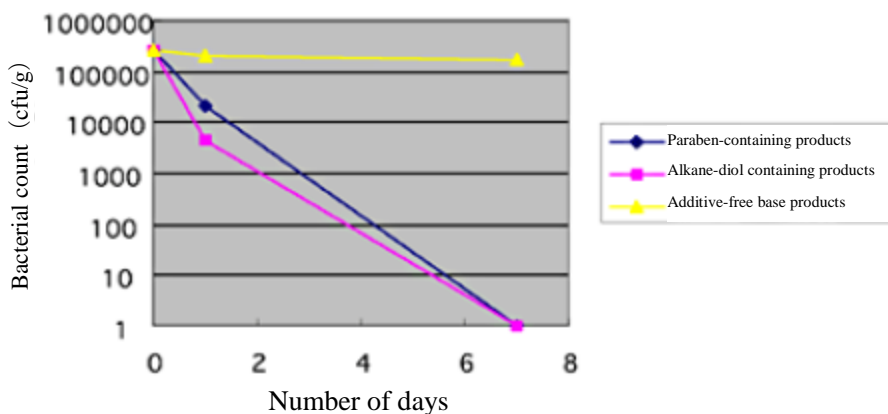
*Minimum inhibitory concentration: Minimum concentration for inhibiting microbial growth.
The lowest concentration at which inhibitory effects are observed.

(2) Comparison of the preservation efficacy of alkanediol-containing cosmetics and paraben-containing cosmetics

In addition, we prepared three types of products: those with preservatives added (parabens) or alkanediols to a model formulation skin lotion, and another with no preservatives (parabens) or alkanediols. We then compared the effectiveness of the preservatives.

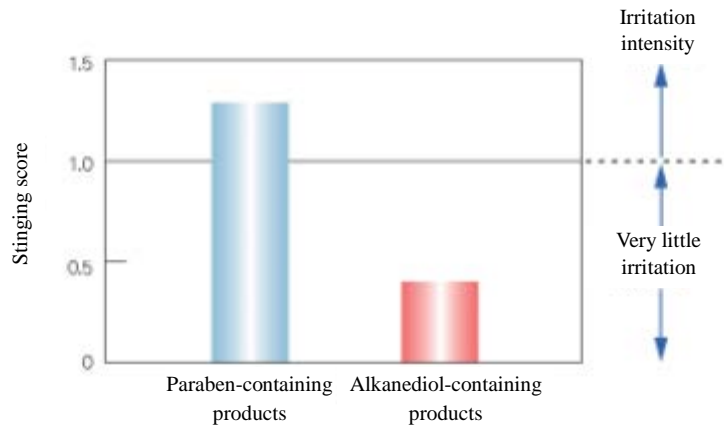
(In the preservative effectiveness tests, we inoculated aseptic product samples with microbes and measured the daily variations in the bacterial count. Based on this, we were able to identify chemicals resistant to deterioration by microbes.

Based on the results, it is clear that products containing alkanediols, and those with parabens have similar preservative effects.



(3) Sensory irritation of alkanediol-containing cosmetics

From a pool of approximately 70 healthy men and women, we sampled seven with high sensitivity to sensory irritation as subjects (=stinger), applied products containing alkanediol and products containing preservatives (parabens) to their cheek, and evaluated sensory irritation. Based on the results of average stinging scores of each of the subjects, we concluded that products containing alkanediols, compared to products containing parabens, had lower sensory stimulation (stinging) in subjects highly sensitive to sensory irritation. It can be said that persons highly sensitive to irritation by parabens account for approximately 10 percent of all users of cosmetics. Based on this study, we are optimistic that cosmetics that are gentle and less irritating for users can be developed.



-Evaluation of sensory irritation in highly sensitive persons-

<Future use in cosmetics>

The plan at Mandom is to develop “preservative-free cosmetics” (cosmetics devoid of preservatives) that contain “alkanediols” based on these studies. As a first step, we intend to begin marketing women’s skin care products by November 2005.

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