

【DESCRIPTION】**【Invention Title】**

URETHANE FOAM FOR USE IN IMPREGNATING COSMETIC COMPOSITION

【Technical Field】

<1> This disclosure relates to urethane foam for use in impregnating cosmetic composition.

【Background Art】

<2> In the old days, cosmetic compositions were used mainly indoors. However, as leisure activities have been generalized recently and modern life styles have been changed correspondingly, cosmetic compositions have been frequently used outdoors. Particularly, in the old days, UV protecting cosmetic compositions were used mostly in summer seasons. However, as modern people enjoy outdoor activities and recognize hazard of UV rays more and more, there is a tendency for UV protecting cosmetic compositions to be used frequently throughout all the seasons besides summer seasons. Therefore, there is an increasing need for cosmetic compositions convenient to use and easy to carry.

<3> Polyester-based urethane foam was developed accidentally by a German technical specialist in the late 1940's during which development of plastics was in the midst. Since such urethane foam is based on polyester, it is also called ester foam. Producing such urethane foam requires no advanced technology. Thus, polyester-based urethane foam has been produced generally and used in various industrial fields, particularly those requiring strong tensile force.

<4> However, polyester-based urethane foam tends to be broken easily under a wet environment. In addition, it has a microcellular structure and low air permeability, and thus shows low cushiony feel, softness and flexibility. As a result, polyester-based urethane foam is not suitable for use in impregnating a cosmetic composition, particularly a liquid cosmetic composition. Under these circumstances, there is an imminent need for developing urethane foam suitable for use in impregnating a cosmetic composition.

【Disclosure】**【Technical Problem】**

<5> This disclosure is directed to providing urethane foam for use in impregnating a cosmetic composition, the urethane foam being capable of maintaining high stability of the cosmetic composition to be impregnated therein and high post-impregnation stability.

【Technical Solution】

<6> In one general aspect, there is provided polyether-based urethane foam for use in impregnating a cosmetic composition.

【Advantageous Effects】

<8> The polyether-based urethane foam disclosed herein maintains high stability even after carrying out impregnation with a cosmetic composition, and improves portability and touch feel of a cosmetic composition.

【Description of Drawings】

<9> Figure 1 is a microscopic view of wet polyether-based urethane foam;

<10> Figure 2 shows a packed make-up product in which a urethane foam impregnated with a W/O type emulsion make-up composition is enclosed;

<11> Figure 3 is a microscopic view of the urethane foams listed in Table 2, each magnified at 10 x 0.3;

<12> Figure 4 is a microscopic view of the urethane foams listed in Table 3, each magnified at 10 x 0.3; and

<13> Figure 5 shows photographs of Example 1, Comparative Example 1 and Comparative Example 2 after storing them at 50°C for 2 hours.

【Mode for Invention】

<14> In one aspect, there is provided polyether-based urethane foam for use in impregnating a cosmetic composition. In another aspect, the polyether-based urethane foam may function as a carrier in which a cosmetic composition is supported and retained.

<15> As used herein, the term 'urethane foam' means a foamed and solidified polyurethane resin, and is also referred to as 'foamed urethane'.

<16> In one aspect, the polyether-based urethane foam is more resistant against humidity as compared to polyester-based urethane foam, and thus is

not broken easily under a high-humidity condition and shows high stability. In addition, the polyether-based urethane foam has a larger cellular structure than polyester-based urethane foam, and thus has improved air permeability, cushiony feel, softness and flexibility. Further, the polyether-based urethane foam requires reduced cost for production, and thus has higher cost-efficiency than polyester-based urethane foam.

<17> In one aspect, urethane foam may include dry urethane foam or wet urethane foam. Particularly, wet polyether-based urethane foam has the properties as shown in the following Table 1.

<18> 【Table 1】

<19>	Item	
	Pore size	200 μm
	Surface Properties	Hydrophilic
	ASKER DUROMETER HARDNESS	90
<20>	Type C hardness	
	Tensile strength	15 kgf/cm^2
	Elongation	260%
	Apparent specific gravity (g/cm^3)	0.21
	Moisture holding ratio	420%

<21> In general, wet polyether-based urethane foam has a smaller pore size and more dense structure than dry polyether-based urethane foam. While dry polyether-based urethane foam has oleophilic surface properties, wet polyether-based urethane foam has hydrophilic surface properties as a result of wet foaming. Wet polyether-based urethane foam is continuous microporous urethane foam having uniform and high porosity, shows high water/oil absorbability, and produces no particles spontaneously. Figure 1 is a microscopic view of wet polyether-based urethane foam.

<22> In one aspect, urethane foam may have a quenched or reticulated structure. In another aspect, urethane foam may have a reticulated structure that allows uniform and easy impregnation with a cosmetic composition and provides a high impregnation ratio.

<23> In one aspect, urethane foam may have a density of 1 to 3 pounds per cubic feet (pcf), particularly 1 to 2 pcf. When urethane foam has a density

less than 1 pcf, a cosmetic composition may be liberated excessively and thus is not convenient to use. When urethane foam has a density higher than 3 pcf, it is not possible to provide a sufficient number of pores through which a cosmetic composition is impregnated, thereby making it difficult to impregnate a cosmetic composition effectively.

<24> In one aspect, urethane foam may have a pore number of 70 to 120 pores per inch (ppi), particularly 75 to 95 ppi. When urethane foam has a pore number less than 70 ppi, it has poor elasticity, is not convenient to use and is not amenable to control of the flowability of a cosmetic composition. When urethane foam has a pore number greater than 120 ppi, it provides low durability and poor touch feel of a cosmetic composition during use.

<25> In one aspect, urethane foam may have an ASKER hardness of 10 to 70, particularly 20 to 60, and more particularly 30 to 50 as measured by DUROMETER HARDNESS TESTER (Type F) available from ASKER. When urethane foam is too soft such that it has a hardness less than 10, a cosmetic composition impregnated in the urethane foam may be liberated excessively, while it is taken by cosmetic tools used for a make-up composition enclosed in a packed container, for example by nitrile butadiene rubber (NBR) puff, or hands. When urethane foam is too hard such that it has a hardness greater than 70, a cosmetic composition may not be liberated easily.

<26> In one aspect, urethane foam may have an open cell structure. When urethane foam has a closed cell structure, air bubbles are kept in urethane so that a low-viscosity emulsion type cosmetic composition may not be impregnated therein easily. Thus, urethane foam having an open cell structure may be used specifically.

<27> In one aspect, the cosmetic composition to be impregnated in urethane foam includes a liquid cosmetic composition, particularly an emulsion type cosmetic composition, and more particularly a water in oil (W/O) type or oil in water (O/W) type emulsion cosmetic composition.

<28> In one aspect, the emulsion cosmetic composition may have a low viscosity, particularly of 5,000 to 15,000 centi poise (cps), and more particularly of 6,000 to 10,000 cps. When the emulsion cosmetic composition

has a viscosity less than 5,000 cps, it may undergo separation into an oil phase and an aqueous phase, thereby making it difficult to impregnate urethane foam uniformly with the composition. When the emulsion cosmetic composition has a viscosity higher than 15,000 cps, it may provide an undesirably tacky and heavy touch feel while applied onto the skin.

<29> In one aspect, the cosmetic composition includes both a skin care composition and a make-up composition. Particular non-limiting examples of the cosmetic composition may include make-up primer, make-up base, foundation, powder, twin cake, lipstick, lip gloss, eye shadow, eyebrow, concealer, lip liner, blusher, UV protecting agent, lotion, cream or essence. More particularly, the cosmetic composition may be formulated into make-up primer, make-up base, liquid or solid foundation, powder, twin cake, lipstick, lip gloss, eye shadow, eyebrow, concealer or blusher, but is not limited thereto.

<30> In one aspect, there is provided a make-up product in which polyether-based urethane foam impregnated with a cosmetic composition is enclosed. The make-up product includes a cosmetic composition applied to the polyether-based urethane foam disclosed herein, and thus allows high-quality packing of the cosmetic composition. In addition, the make-up product allows the cosmetic composition to be supported uniformly in urethane foam for a long period of time and to be liberated in an adequate amount when users take the cosmetic composition. Further, the make-up product maintains high long-term durability and stability. The make-up product disclosed herein may be provided as a packed container, abbreviated generally as 'pact', which includes a container having a lower part in which polyether-based urethane foam is received, and an upper part having a lid to which a mirror or the like may be attached. Figure 2 shows an exemplary image of polyether-based urethane foam provided in a packed container.

<31>

<32> The examples, comparative examples, preparation examples and test examples will now be described. The following examples are for illustrative purposes only and not intended to limit the scope of this disclosure.

[Test Example 1] Determination of Properties of Urethane Foam

To select urethane foam suitable for impregnation with a W/O type or O/W type low-viscosity emulsion cosmetic composition, various types of urethane foam are determined for their properties. The following Tables 2 and 3 show each type of urethane foam and the corresponding properties. In addition, Figure 3 and Figure 4 are microscopic views of each type of urethane foam magnified at 10 x 0.3.

【Table 2】

	Polyester-based urethane foam 1 (conventional urethane foam)	Polyester-based urethane foam 2 (Q100UT)	Polyester-based urethane foam 3 (QS100EB)
Pore per inch (ppi)	80 ppi	85 ppi	85 ppi
Density (pcf)		1.7	1.7-2.0
Available from	Germany	Foamtec(Thailand)	Foamtec(Thailand)
Remarks	Flexible polyurethane foam	Polyester-Polyurethane, Quenched foam	Polyester-Polyurethane, Reticulated foam
Hardness	45	48	

【Table 3】

	Polyether-based urethane foam 1 (EZ93N)	Polyester-based urethane foam 4 (ZH100KT)	Polyester-based urethane foam 5 (ZH100LG)
Pore per inch (ppi)	88-100 ppi	90 ppi	90 ppi
Density (pcf)	1.8-2.0	5.4-6.60	5.4-6.60
Available from	Foamtec (Thailand)	Foamtec (Thailand)	Foamtec (Thailand)
Remarks	Polyether-Polyurethane, Reticulated foam	Polyester-Polyurethane, Reticulated foam	Polyester-Polyurethane, Reticulated foam
Hardness	45		

In Table 3, Polyether-based urethane foam 1 is dry polyether-based urethane foam.

[Test Example 2] Evaluation of Formulation Stability

Among the different kinds of urethane foam listed in Tables 2 and 3, Polyether-based urethane foam 1 (Example 1), Polyester-based urethane foam 2 (Comparative Example 1) and Polyester-based urethane foam 3 (Comparative Example 2) are selected and subjected to impregnation with a W/O type emulsion make-up composition. Then, their stabilities are evaluated as a function of storage temperature and time. The results are shown in the following Table 4 and Figure 5. Figure 5 shows photographs of Example 1, Comparative Example 1 and Comparative Example 2 after storing them at 50°C for 2 hours.

【Table 4】

	55°C, after 7 days	45°C -> 30°C -> frozen at -10°C (each for 8 hours), after 5 days	30°C, after 7days
Example 1	Stable	Stable	Stable
Comparative Example 1	Urethane foam broken	Urethane foam broken	Stable
Comparative Example 2	Urethane foam broken	Urethane foam broken	Stable

As can be seen from the above results, when each foam is impregnated with a W/O type emulsion make-up composition, each urethane foam according to Comparative Examples 1 and 2 is broken, causes separation of the make-up composition and generates air bubbles with time under a high temperature or severe change in temperature, and thus is shown to be very unstable. On the contrary, Example 1 substantially maintains its original state and shows high stability.

Therefore, it can be seen that polyether-urethane foam shows higher stability than polyester-based urethane foam upon impregnation with a cosmetic composition, and thus is more suitable for impregnating a cosmetic composition.

[Preparation Examples 1 and 2] Preparation of UV Protecting Cosmetic Composition

In Preparation Examples 1 and 2, W/O type emulsion UV protecting cosmetic compositions are prepared according to the formulation of the

following Table 5.

<50> Particularly, a UV protecting agent is introduced to oily ingredients and dissolved and emulsified therein. Next, the oily ingredients are mixed with a surfactant and heated to and agitated at 80°C so that the mixture is homogenized. Then, a pigment is further added thereto, followed by agitation and homogenization, to provide an oily part. In a separate mixer, aqueous ingredients are mixed and heated to and agitated at 80°C to provide a completely dissolved aqueous part. The prepared aqueous part is introduced gradually to the oily part and subjected to emulsification by using a homogenizer mixer. After cooling to 50°C, skin protecting ingredients and fragrances are introduced thereto, followed by cooling, to provide a low-viscosity W/O type emulsion UV protecting cosmetic composition.

<51> **【Table 5】**

<52>

		Ingredients (wt%)	Prep. Ex. 1	Prep. Ex. 2
Oily Part	Oily Ingredients	Ozokerite	0.1	1.0
		Dicaprylyl carbonate	10.00	10.00
	Preservative	Methyl paraben	0.100	0.100
	UV protecting agents	Octylmethoxy cinnamate	7.000	7.000
		Isoamyl p-methoxy cinnamate	2.000	2.000
	Pigment	Disteardimonium hectorite	0.20	1.50
	Oily Ingredients	Decamethylcyclopentasilxane	16.00	16.00
	Emulsifiers	Sorbitan sesquioleate	2.000	2.000
		Lauryl PEG/PPG-18/18 methicon	1.500	1.500
	Pigments	Polymethyl methacrylate	5.00	5.00
		Titanium dioxide/Aluminum hydroxide/Stearic acid	7.00	7.00
<53> Aq. Part		Water	To 100	To 100
	Moisturizer	Glycerin	8.000	8.000
	Emulsion stabilizer	Sodium chloride	1.00	1.00
		Fragrance	0.400	0.400
Total			100	100

<54>

In Table 5, disteardimonium hectorite functions as a thickening agent, polymethyl methacrylate serves as a pure body pigment, and titanium dioxide/aluminum hydroxide/stearic acid serves as an inorganic UV protecting agent.

<55> [Test Example 3] Evaluation of Preference Depending on Hardness of Urethane Foam

<56> Different types of polyether-based urethane foam having a different value of hardness are impregnated with Preparation Examples 1 and 2, and user preference of each case is determined. Particularly, 50 females are divided into two groups (each group having 25 persons). They are allowed to apply each of Preparation Example 1 and Preparation Example 2 impregnated in polyether-based urethane foam having a different value of hardness to their skin with NBR puff for 2 days. Then, overall user preference including touch feel and coating quality is evaluated in each case. The results are shown in

the following Tables 6 and 7.

【Table 6】

	Cosmetic composition used for impregnation	Hardness of urethane foam (ASKER hardness, Type F)	Preference (%)
Example 2	Preparation Example 1	5	5
Example 3	Preparation Example 1	80	10
Example 4	Preparation Example 1	40	85

【Table 7】

	Cosmetic composition used for impregnation	Hardness of urethane foam (ASKER hardness, Type F)	Preference (%)
Example 5	Preparation Example 2	5	5
Example 6	Preparation Example 2	80	5
Example 7	Preparation Example 2	40	90

As can be seen from the above results, the highest preference is available when polyether-based urethane foam used for impregnation with both compositions according to Preparation Examples 1 and 2 has Asker hardness value of 40.

Those skilled in the art will appreciate that the conceptions and specific embodiments disclosed in the foregoing description may be readily utilized as a basis for modifying or designing other embodiments for carrying out the same purposes of the present disclosure. Those skilled in the art will also appreciate that such equivalent embodiments do not depart from the spirit and scope of the disclosure as set forth in the appended claims.

【CLAIMS】**【Claim 1】**

<66> Polyether-based urethane foam for impregnating a cosmetic composition.

【Claim 2】

<67> The polyether-based urethane foam according to claim 1, which has a reticulated structure.

【Claim 3】

<68> The polyether-based urethane foam according to claim 1, which has a density of 1 to 3 pcf.

【Claim 4】

<69> The polyether-based urethane foam according to claim 1, which has a pore number of 70 to 120 pores per inch (ppi).

【Claim 5】

<70> The polyether-based urethane foam according to claim 1, which has a ASKER hardness of 10 to 70.

【Claim 6】

<71> The polyether-based urethane foam according to claim 1, which has an open cell structure.

【Claim 7】

<72> The polyether-based urethane foam according to claim 1, wherein the cosmetic composition is a water in oil (W/O) type or oil in water (O/W) type emulsion cosmetic composition.

【Claim 8】

<73> The polyether-based urethane foam according to claim 1, wherein the emulsion cosmetic composition has a viscosity of 5,000-15,000 cps.

【Claim 9】

<74> The polyether-based urethane foam according to claim 1, wherein the cosmetic composition is provided as make-up primer, make-up base, foundation, powder, twin cake, lipstick, lip gloss, eye shadow, eyebrow, concealer or blusher.