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(54) **TRANSPARENT SOLID SOAP**

(57) The present invention relates to a transparent bar soap which includes (A) saturated straight-chain fatty acids having 12 to 18 carbon atoms and/or salts thereof and is substantially free from a branched fatty acid salt and an unsaturated fatty acid salt, the transparent bar soap further including (B) one or more substances selected from the group consisting of nonionic surfactants, amphoteric surfactants, polyhydric alcohols which are kept in a liquid state at a room temperature, and saccharides, (C) an inorganic salt, and (D) water, wherein the fatty acids constituting the component (A) are present in an amount of from 20 to 40% by weight on the basis of the entire amount of the bar soap, the components (A) and (B) are present in such an amount that a weight ratio of the fatty acids constituting the component (A) to the component (B) is from 30:70 to 45:55, the component (C) is present in an amount of from 0.5 to 5% by weight on the basis of the entire amount of the bar soap, and

the component (D) is present in a remainder amount of the bar soap, wherein C₁₂, C₁₄, C₁₆ and C₁₈ fatty acids constituting the component (A) are present in such an amount that a weight ratio of the C₁₂ fatty acid to a sum of the C₁₆ fatty acid and the C₁₈ fatty acid is in the range of from 30:70 to 60:40, a weight ratio of the C₁₂ fatty acid to the C₁₄ fatty acid is in the range of from 20:80 to 80:20, and a total amount of the C₁₂ fatty acid and the C₁₄ fatty acid is from 14 to 22% by weight on the basis of the entire amount of the bar soap. The transparent bar soap has a high transparency, a good foamability especially in hard water and a suitable hardness necessary for bar soaps, and is free from problems concerning deterioration of its smell over time and sogginess. The bar soap also has a high productivity and can be easily molded into a desired shape.

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Description

Field of the Invention

5 **[0001]** The present invention relates to a transparent bar soap and a process for producing the same.

Background of the Invention

10 **[0002]** Among fatty acid soaps containing a sodium salt of a higher fatty acid as a main ingredient, there is known a transparent bar soap in which a transparency agent such as glycerin, sorbitol and sucrose is incorporated to inhibit crystallization thereof and instead form fine crystals to thereby impart a transparent appearance thereto. Such a transparent bar soap, which contains a large amount of humectants such as polyhydric alcohols and saccharides, has an excellent skin protecting effect, provides a mild use feeling, and is mainly used for face cleansing purposes. Hitherto, transparent bar soaps have been produced by a so-called framing method in which a fatty acid soap and a transparency agent is heated and dissolved in a mixed solvent containing a lower alcohol such as ethanol, and water, and the resulting solution is poured into a given frame and aged in order to let the volatile solvent gradually evaporate to solidify, which requires over several tens of days (refer to JP 57-30798A and JP 2002-80896A). The transparent bar soaps obtained by the above method have an advantage that its transparency is high, but have drawbacks such as poor production efficiency. Further, the product obtained by the framing method must be cut and reshaped with stamp into a final product shape after the solidification, and has drawbacks such as the need of an additional shaping step and the generation of soap scraps.

25 **[0003]** On the other hand, a milled transparent bar soap composition obtained by compounding an electrolyte and a specific nonionic surfactant in a fatty acid soap has been proposed (refer to JP 8-283795A). In such invention, it is described that the obtained transparent bar soap is improved in term of occurrence of excess melting before and after use, and has an excellent transparency. However, in the described method, it is difficult to uniformly mix the nonionic surfactant in the soap. Therefore, the obtained soap is not fully satisfactory with respect to transparency. Further, the milling method generally has a problem that an additional shaping step is necessary and soap scraps are generated, because it is necessary to extrude the soap composition in the form of a bar and to further stamp the obtained bar into a final product shape.

30 **[0004]** Also, there has been proposed a framed bar cleanser containing a saturated branched fatty acid salt and/or an unsaturated fatty acid salt and an alkyleneoxide derivative (refer to JP 2004-143114A). In such invention, it is described that the obtained skin cleanser can exhibit a good foamability, a good rinsing property, a good feeling upon use, and sufficient hardness and stability as a bar soap. However, the hardness of the framed bar cleanser is insufficient as compared with ordinary fatty acid soaps. In addition, in such invention which adopts the framing method, a long process time is necessary and, therefore, the problem of low production efficiency remains unsolved. Moreover, such invention involves a problem of smell attributed to the branched fatty acid and unsaturated fatty acid.

Summary of the Invention

40 **[0005]** In view of the foregoing problems, the present invention relates to a transparent bar soap which has a high transparency, a good foamability especially in hard water and a suitable hardness necessary for bar soaps and which is free from problems concerning deterioration of its smell over time; the present invention also relates to a production process which is capable of producing such a transparent bar soap having a desired shape with a high production efficiency.

45 **[0006]** The present inventor has found that the above problems can be solved by a transparent bar soap which includes saturated straight-chain fatty salts having 12 to 18 carbon atoms but is substantially free from a branched fatty acid salt and an unsaturated fatty acid salt, wherein a compounding proportion of the fatty acids as well as a compounding proportion of an agent having a transparency-imparting effect are controlled to respective specific ranges, and a specific amount of an inorganic salt is incorporated thereinto.

50 **[0007]** That is, the present invention relates to a transparent bar soap which includes (A) saturated straight-chain fatty acids having 12 to 18 carbon atoms and/or salts thereof but is substantially free from a branched fatty acid salt and an unsaturated fatty acid salt, the transparent bar soap further including (B) one or more substances selected from the group consisting of nonionic surfactants, amphoteric surfactants, polyhydric alcohols which are kept in a liquid state at a room temperature, and saccharides, (C) an inorganic salt, and (D) water, wherein the fatty acids constituting the component (A) are present in an amount of from 20 to 40% by weight on the basis of the entire amount of the bar soap, the components (A) and (B) are present in such an amount that a weight ratio of the fatty acids constituting the component (A) to the component (B) is from 30:70 to 45:55, the component (C) is present in an amount of from 0.5 to 5% by weight on the basis of the entire amount of the bar soap, and the component (D) is present in a remainder amount of the bar

soap, and

wherein C_{12} , C_{14} , C_{16} and C_{18} fatty acids constituting the component (A) are present in such an amount that a weight ratio of the C_{12} fatty acid to a sum of the C_{16} fatty acid and the C_{18} fatty acid is in the range of from 30:70 to 60:40, a weight ratio of the C_{12} fatty acid to the C_{14} fatty acid is in the range of from 20:80 to 80:20, and a total amount of the

[0008] The present invention also relates to a process for producing a transparent bar soap from a soap composition which includes (A) saturated straight-chain fatty acids having 12 to 18 carbon atoms and/or salts thereof, (B) one or more substances selected from the group consisting of nonionic surfactants, amphoteric surfactants, polyhydric alcohols which are kept in a liquid state at a room temperature, and saccharides, (C) an inorganic salt, and (D) water, wherein the fatty acids constituting the component (A) are present in an amount of from 20 to 40% by weight on the basis of the entire amount of the soap composition, wherein C_{12} , C_{14} , C_{16} and C_{18} fatty acids constituting the component (A) are present in such an amount that a weight ratio of the C_{12} fatty acid to a sum of the C_{16} fatty acid and the C_{18} fatty acid is in the range of from 30:70 to 60:40, a weight ratio of the C_{12} fatty acid to the C_{14} fatty acid is in the range of from 20:80 to 80:20, and a total amount of the C_{12} fatty acid and the C_{14} fatty acid is from 14 to 22% by weight on the basis of the entire amount of the soap composition, and wherein the components (A) and (B) are present in such an amount that a weight ratio of the fatty acids constituting the component (A) to the component (B) is from 30:70 to 45:55, the component (C) is present in an amount of from 0.5 to 5% by weight on the basis of the entire amount of the soap composition, and the component (D) is present in a remainder amount of the bar soap, the process including the steps of heating and melting the soap composition to obtain a homogeneous composition, pouring the homogeneous composition into a mold, and cooling and solidifying the poured composition to obtain a molded bar soap.

[0009] The transparent bar soap of the present invention has a high transparency, a good foamability especially in hard water and a suitable hardness necessary for bar soaps and is free from problems concerning deterioration of its smell over time. The transparent bar soap may be easily produced only by pouring a molten soap composition into a mold cavity having a desired shape and then cooling the poured composition. Thus, molded bar soap products having a desired shape may be produced with a high productivity.

Detailed Description of the Invention

[0010] The transparent bar soap of the present invention contains, as a main ingredient thereof, (A) saturated straight-chain fatty acids having 12 to 18 carbon atoms and/or salts thereof and is substantially free from a branched fatty acid salt and an unsaturated fatty acid salt. As a result of this constitution, it is possible to harden the soap only by cooling it for a short period of time and, therefore, to greatly improve the productivity. Further, the transparent bar soap of the present invention may be produced by a casting method. Namely, bar soaps having a desired shape may be efficiently produced by pouring a molten soap composition into a mold cavity having a shape conforming to that of the final product, followed by cooling and solidification of the poured composition.

A branched fatty acid salt and an unsaturated fatty acid salt have been conventionally used in bar soap compositions owing to their effect of improving the transparency thereof. However, these salts tend to reduce the hardness of the soap. On the other hand, the transparent bar soap of the present invention is substantially free from the branched fatty acid salt and the unsaturated fatty acid salt and, therefore, exhibits a good hardness. Further, the soap has an excellent stable smell and fragrance because neither branched fatty acid salt nor unsaturated fatty acid salt is contained in the soap. The term "substantially free from a branched fatty acid salt and an unsaturated fatty acid salt" as used herein means that the content of these salts in the transparent bar soap composition of the present invention is 2% by weight or less.

[0011] In the transparent bar soap of the present invention, the fatty acid constituting the component (A) has the following compositional requirements:

(1) the weight ratio of the C_{12} fatty acid to a sum of the C_{16} fatty acid and the C_{18} fatty acid ($C_{12}:(C_{16}+C_{18})$) (weight ratio in terms of fatty acid; hereinafter, the weight of the component (A) is described in terms of the weight of the respective fatty acids constituting the component (A)) is in the range of from 30:70 to 60:40;

(2) the weight ratio of the C_{12} fatty acid to the C_{14} fatty acid ($C_{12}:C_{14}$) is in the range of from 20:80 to 80:20; and

(3) the total amount of the C_{12} fatty acid and the C_{14} fatty acid is from 14 to 22% by weight on the basis of the entire amount of the bar soap.

In the present invention, a high transparency and a satisfactory foamability may be achieved by controlling the chain length distribution of the saturated straight-chain fatty acids as defined in (1) to (3) above.

When ingredients of the component (A) are fatty acid salts, the term "fatty acids constituting the component (A)" as used herein is intended to mean fatty acids before the fatty acid salts are formed by neutralizing the fatty acids with a base.

[0012] In the above requirement (1), the weight ratio of the C_{12} fatty acid (lauric acid) to a sum of the C_{16} fatty acid

(palmitic acid) and the C₁₈ fatty acid (stearic acid) is preferably in the range of from 30:70 to 50:50.

[0013] In the above requirement (2), the weight ratio of the C₁₂ fatty acid to the C₁₄ fatty acid (myristic acid) is preferably in the range of from 30:70 to 80:20 and more preferably from 50:50 to 75:25.

[0014] In the above requirement (3), the total amount of the C₁₂ fatty acid and the C₁₄ fatty acid is preferably from 16 to 22% by weight.

[0015] In the transparent bar soap of the present invention, the content of the fatty acids constituting the component (A) is preferably in the range of from 20 to 40% by weight and more preferably from 25 to 35% by weight on the basis of the entire amount of the bar soap. When the fatty acid content lies within the above-specified range, a suitable balance between the component (A), the component (B) which has an effect of suppressing the crystallization of the fatty acid soap, the component (C) which has an effect of imparting a good stability in hard water to the soap, a neutralizing agent and water necessary for dissolving the respective ingredients, so that the aimed object of the present invention can be effectively achieved.

[0016] In the present invention, the above saturated straight-chain fatty acids may be present in the form of salts neutralized with a base usually employed. Examples of the neutralized salts include alkali metal salts, amine salts, alkanolamine salts and basic amino acid salts. Among these salts, preferred are alkali metal salts such as sodium salts and potassium salts, and more preferred are sodium salts. The neutralizing agent used above may be added in such an amount that substantially 100% of the fatty acids are neutralized.

[0017] The component (B) of the transparent bar soap of the present invention includes one or more substances selected from the group consisting of nonionic surfactants, amphoteric surfactants, polyhydric alcohols which are kept in a liquid state at a room temperature, and saccharides. These substances have a function to suppress crystallization of a fatty acid soap during the cooling and solidification upon production of the bar soap and to contribute to the transparency thereof.

[0018] Examples of the nonionic surfactant include compounds having, as a hydrophilic group, a polyoxyethylene group having an average number of moles of ethyleneoxides added of from 6 to 150 and preferably from 10 to 50. Among these compounds, preferred are compounds which contain an alkyl group having 10 to 18 carbon atoms and preferably 12 to 14 carbon atoms as a hydrophobic group and which have an HLB (Hydrophile Lipophile Balance) value of 8 or more and preferably 10 or more.

[0019] Examples of the suitable nonionic surfactants include polyoxyethylene (20) sorbitan lauric acid ester ("RHE-ODOL SUPER TW-L120" (trade name) available from Kao Corporation) having an HLB value of 14, polyoxyethylene (20) octyldodecyl ether ("EMULGEN 2020G" (trade name) available from Kao Corporation; or "EMULEX OD-20" (trade name) available from Nippon Emulsion Co., Ltd.) having an HLB value of 13, polyethylene glycol monolaurate ("EMANON 1112" (trade name) available from Kao Corporation) having an HLB value of 13.7, polyoxyethylene (23) lauryl ether ("EMULGEN 123P" (trade name) available from Kao Corporation) having an HLB value of 16.9, and polyoxyethylene (30) lauryl ether ("EMULEX 730" (trade name) available from Nippon Emulsion Co., Ltd.) having an HLB value of 18. The above HLB values are those given in the catalogues of the respective manufacturers.

[0020] Examples of the amphoteric surfactants include betaine surfactants, amino acid surfactants, imidazoline surfactants and amine oxide surfactants. Among these amphoteric surfactants, betaine surfactants are preferred from the viewpoint of improving foamability and transparency of the resulting soap.

[0021] The content of the nonionic surfactant in the transparent bar soap is preferably from 3 to 15% by weight. When the content of the nonionic surfactant lies within the above-specified range, both good transparency and suitable hardness necessary for bar soaps can be attained. From the same viewpoints as described above, the content of the nonionic surfactant is more preferably from 5 to 10% by weight.

The content of the amphoteric surfactant in the transparent bar soap is preferably from 0 to 10% by weight and more preferably from 0 to 5% by weight from the same viewpoints as described above for the nonionic surfactant.

[0022] When the above-described nonionic surfactant and amphoteric surfactant are used together, it is preferred that the total content of these surfactants in the transparent bar soap be in the range of from 5 to 20% by weight. When the total content of these surfactants lies within the above-specified range, the effect of the surfactants can be sufficiently exhibited, and suitable hardness necessary for bar soaps can be attained. From the same viewpoints as described above, when the above-described nonionic surfactant and amphoteric surfactant are used together, the total amount of these surfactants in the transparent bar soap is more preferably in the range of from 5 to 15% by weight.

[0023] The polyhydric alcohols which are kept in a liquid state at a room temperature include polyhydric alcohols and glycol ethers, and particularly preferred are glycols (inclusive of glycols and glycol ethers). Specific examples of the glycols include those glycols having an IOB value of 3 or less, such as isoprene glycol (IOB: 2.00), dipropylene glycol (IOB: 1.83), ethoxy diglycol (diethylene glycol monoethyl ether; IOB: 1.63) and 1,3-butylene glycol (IOB: 2.50). The use of these glycols is preferable from the viewpoint of improved transparency and foamability of the obtained bar soap.

[0024] The term "IOB" (Inorganic Organic Balance) as used herein represents a ratio of an inorganic value to an organic value as determined in accordance with an organic conceptional diagram (Atsushi Fujita, "Prediction of Organic Compounds and Organic Conceptional Diagram", Kagaku no Ryoiki, Vol. 11, No. 10 (1957), pp. 719-725), and may be

expressed by the following formula (I):

[0025]

$$5 \quad \text{IOB} = (\text{Inorganic value})/(\text{Organic value}) \quad (\text{I})$$

[0026] The content of the polyhydric alcohol which is kept in a liquid state at a room temperature in the transparent bar soap is preferably from 5 to 50% by weight. When the content of the polyhydric alcohol lies within the above-specified range, the obtained bar soap is advantageously improved in foamability and transparency and further enhanced in productivity owing to suppressed crystallization of saccharides and reduced viscosity of the soap composition during the production thereof. In addition, the resulting bar soap can also advantageously maintain a suitable hardness and exhibit an improved foamability. From the same viewpoints as described above, the content of the polyhydric alcohol which is kept in a liquid state at a room temperature is more preferably from 10 to 40% by weight. The above polyhydric alcohol may be used in combination with a polyhydric alcohol having an IOB value of more than 3 such as propylene glycol (IOB: 3.33) and glycerin (IOB: 5.00) unless the transparency and foamability of the resulting bar soap are adversely affected.

[0027] As the saccharides, there may be suitably used those which are kept in a solid state at a room temperature. Examples of the preferred saccharides include sugar alcohols of a monosaccharide having 4 to 6 carbon atoms or a disaccharide, such as mannitol, xylitol, maltitol, erythritol and sorbitol. The saccharides have a high crystallization-preventing effect in the soap, and can contribute to the transparency of the bar soap to a large extent. Also, the saccharides are preferably used for reasons of their effect of improving the foamability. In addition, the use of the saccharides gives an additional merit that coloration by a caramel reaction is unlikely to occur during a neutralizing step of the bar soap production process. These saccharides may be used alone or in combination of any two or more thereof.

The content of the saccharide in the transparent bar soap is preferably from 10 to 30% by weight. When the content of the saccharide lies within the above-specified range, the effect of addition thereof is sufficiently exhibited, and further crystallization of an inside of the bar soap is unlikely to occur during the storage so that the transparency thereof can be retained. From the same viewpoints as described above, the content of the saccharide in the bar soap is more preferably from 10 to 20% by weight.

[0028] The compounds used as the component (B) of the transparent bar soap of the present invention have a function to impart transparency to the bar soap and also have various different properties. Therefore, by suitably selectively combining different compounds, it is possible to control not only the transparency but also the foamability, hardness, feeling upon use, etc., in view of the characteristics of the selected compounds and to obtain the optimum formulations meeting the properties as necessary. The component (B) is preferably a combination of the polyhydric alcohol which is kept in a liquid state at a room temperature with the surfactant or a combination of the polyhydric alcohol which is kept in a liquid state at a room temperature with the saccharide. Further preferred is a combination of the polyhydric alcohol which is kept in a liquid state at a room temperature with the surfactant and the saccharide.

[0029] The weight ratio of the component (A) (in terms of fatty acids) to the component (B) is in the range of from 30:70 to 45:55. When the weight ratio lies within the above-specified range, the resulting bar soap can exhibit a good transparency and further show a satisfactory foamability during use. From the same viewpoints as described above, the weight ratio of the component (A) (in terms of fatty acids) to the component (B) is in the range of from 40:60 to 45:55.

[0030] The content of the component (B) in the transparent bar soap of the present invention is preferably in the range of from 20 to 50% by weight and more preferably from 30 to 45% by weight. When the content of the component (B) lies within the above-specified range, a suitable balance between the component (A), the component (C) which will be described in detail hereinafter, a neutralizing agent and water necessary for dissolving the respective ingredients can be attained, so that the aimed object of the present invention may be effectively achieved.

[0031] The transparent bar soap of the present invention contains an inorganic salt as the component (C) in an amount of from 0.5 to 5% by weight. When the content of the component (C) lies within the above-specified range, the resulting bar soap has enhanced stability in hard water. More specifically, the bar soap shows a sufficient foaming capability even in hard water having, for example, a hardness of 4, and further has a satisfactory transparency. From the same viewpoints as described above, the content of the inorganic salt is preferably from 1 to 3% by weight.

Any suitable inorganic salt may be used without particular limitation. Examples of the inorganic salt include sodium chloride, potassium chloride, sodium sulfate, sodium carbonate and sodium nitrate. Among these inorganic salts, sodium chloride is preferred because of a satisfactory hardness of the resulting soap, a good availability and easiness in handling.

[0032] The transparent bar soap of the present invention may also contain a non-soap anionic surfactant for the purpose of improving the foamability at a low temperature and the dispersibility of soap scum. Examples of the non-soap anionic surfactant include salts of alkanoyl isethionate, salts of polyoxyethylene alkyl ether sulfate, salts of N-acylmethyltaurine, salts of N-acylsarcosinate, salts of N-acylated amino acid, salts of (di)alkyl sulfosuccinate and salts

of monoalkyl phosphate.

[0033] The transparent bar soap of the present invention may also contain an organic acid other than fatty acids for the purpose of stabilizing the fragrance thereof. Examples of the organic acid include lactic acid and gluconic acid. The content of the organic acid in the transparent bar soap is preferably from 0.01 to 3% by weight and more preferably from 0.1 to 1% by weight.

[0034] The transparent bar soap of the present invention additionally contains water as the component (D) which serves as a medium for forming a homogeneous melt of the above-described essential components and other components optionally used if necessary. The content of water as the component (D) is from about 10 to about 40% by weight. Incidentally, since the soap composition of the present invention solidifies rapidly, the water is contained in the transparent bar soap immediately after production in the almost same amount as that before the solidification.

[0035] In addition to the above-described components, the transparent bar soap of the present invention may also contain other components conventionally employed in framed soaps, such as an antimicrobial agent, a perfume, a pigment, a dye, an oil and an irritation reducing agent. Examples of the antimicrobial agent include trichlosan and trichlorocarbanilide. The content of the antimicrobial agent in the bar soap is usually from 0.01 to 2% by weight. The contents of the perfume, pigment and dye in the bar soap are each usually from 0.02 to 5% by weight. Examples of the oil include lanolin, paraffin, vaseline and isopropyl myristate. The content of the oil in the bar soap is usually from 0.05 to 5% by weight.

[0036] The transparent bar soap of the present invention may be produced by pouring a melt of a soap composition containing the above components (A), (B), (C) and (D) into a mold cavity having a shape conforming to that of the final product, followed by cooling and solidifying the poured melt to obtain a molded transparent bar soap having the desired product shape.

A fatty acid salt dissolved in water tends to crystallize by salting out in the presence of an inorganic salt. In the present invention in which the fatty acids are present in the specific proportions, crystallization of the fatty acids does not proceed because of their metastable state. However, when the component (B) is present in such a metastable state in the course of cooling, crystallization of the component (A) rapidly proceeds on the periphery of the component (B). For this reason, it is suggested that crystals of the component (A) are finely divided so that a bar soap having a high transparency is obtained. Thus, the bar soap can be produced over a short period of time. Also, for the above reason, the soap has a very fine and dense structure so that problems such as sogginess caused by water and lack of hardness can be solved. In the conventional framing method, a soap composition in a molten state is placed in a given frame. This method must be followed by the essential step of evaporating ethanol or water from the soap composition to increase the transparency. It takes about 2 months to solidify the soap composition. In contrast, the production process of the present invention does not require such a step.

[0037] In the above production process, C_{12} to C_{18} saturated straight-chain fatty acids, (B) one or more substances selected from the group consisting of nonionic surfactants, amphoteric surfactants, polyhydric alcohols which are kept in a liquid state at a room temperature, and saccharides, (C) an inorganic salt, and (D) water are mixed in predetermined proportions, followed by heating and melting the resulting mixture. Then, a base diluted with a part of the water is added to the obtained melt to neutralize the fatty acids, followed by confirming that a homogeneous transparent composition is obtained. Alternatively, C_{12} to C_{18} saturated straight-chain fatty acids, (B) one or more substances selected from the group consisting of nonionic surfactants, amphoteric surfactants and polyhydric alcohols which are kept in a liquid state at a room temperature, and (D) water are mixed in predetermined proportions, followed by heating and melting the resulting mixture. Then, a base diluted with a part of the water is added to the obtained melt to neutralize the fatty acids. After confirming that a homogeneous transparent composition is obtained, (C) an inorganic salt and (B) a saccharide which are dissolved in a part of the water are added thereto and homogeneously dissolved therein.

Upon the preparation of the soap composition in a molten state, the predetermined components are mixed while heating at a temperature of usually from about 60 to about 90°C.

[0038] The thus prepared soap composition may be molded in a frame as used for the production of conventional framed soap. The soap composition of the present invention is **characterized in that** a bar soap may be obtained within a very short period of time by simply cooling and solidifying the soap composition.

Thus, according to the present invention, a melt of the soap composition can be molded only by directly pouring the melt into a mold cavity having a shape conforming to that of the final product and then cooling and solidifying the poured melt. Therefore, a transparent bar soap having the desired shape can be obtained within a short period of time. The cooling and solidifying time may be suitably determined according to the composition and formulating amount of the fatty acids, the formulating amount of the transparency agent, etc. The cooling and solidifying time may also vary depending upon the material and temperature of the mold, the size of the mold cavity, the amount of the soap composition to be charged, outside air temperature, presence or absence of cooling water, etc., but is usually from about 10 to about 60 min.

EXAMPLES

Example 1

[0039] The fatty acids, the polyhydric alcohol which was kept in a liquid state at a room temperature and the surfactant as shown in Table 1 were mixed and molten at 80°C. The resulting melt was neutralized by gradually dropping 48% aqueous solution diluted with 5% by weight of water into the melt. After the neutralized solution became transparent and homogeneous, a solution separately prepared by mixing sodium chloride, a saccharide and purified water which was heated to 80°C, was added to the neutralized solution. The obtained solution was further mixed for 15 min. at 80°C to obtain a soap composition in a molten state.

[0040] The thus obtained soap composition was evaluated by the following methods. The results are shown in Table 1.

Evaluation methods:

1. Transparency

[0041] Five milliliters of the soap composition kept in a molten state were poured at 80°C into a balance dish (35×35×10 mm) and allowed to stand therein for cooling and solidifying. The obtained bar soap was then taken out of the dish. It took about 20 min. to cool and solidify the soap composition when allowing it to stand at room temperature (25°C). The obtained bar soap was placed on a black mount for photographs and measured for its transparency using a chroma-meter ("MINOLTA CR-200" available from Konica Minolta Holdings, Inc.). The transparency was evaluated in terms of an L* value (lightness) in the L*a*b* system. When the L* value is 38 or less, the transparency is regarded as being good so that letters having a size of 5 points or less can be seen through the bar soap. When measured by the above method, a commercially available framed transparent soap had an L* value of 33 and another commercially available bar soap (for example, "WHITE" available from Kao Corporation; white opaque) had an L* value of 70.

2. Foamability

[0042] Hard water with a hardness of 4 degrees was prepared using MgCl₂. Using the thus prepared hard water, a 1% aqueous solution of the above soap composition was prepared. Five grams of the obtained aqueous solution was placed in a 200 mL measuring cylinder and shaken 50 times at 30°C. Then, the height (mm) of foam thus formed was measured. The amount of the foam formed in the above test had the following correlation with the sensory evaluation by panelists. A height of 20 mm or more is regarded as being good in foamability.

25 mm or more: Among 10 panelists, 9 to 10 panelists had a sense of good foamability.

20 mm or more but less than 25 mm: Among 10 panelists, 6 to 8 panelists had a sense of good foamability.

15 mm or more but less than 20 mm: Among 10 panelists, 2 to 5 panelists had a sense of good foamability.

Less than 15 mm: Among 10 panelists, no panelist or only one panelist had a sense of good foamability.

3. Hardness of bar soap

[0043] The melt of the soap composition was poured into a mold cavity and then cooled and solidified. The obtained bar soap was taken out of the mold cavity. It took about 60 min. to cool and solidify the soap composition. The 15 mm-thick bar soap obtained after the solidification was then measured for its hardness at a central region thereof using a hardness tester ("ASKER Rubber Hardness Tester Type C" available from Kobunshi Keiki Co., Ltd.; JIS K7312). When measured by the above method, an ordinary commercially available bar soap (for example, "WHITE" available from Kao Corporation) had a hardness of 85 to 95 and another commercially available relatively soft soap (for example, "PURE WHIP SOAP" available from Kao Corporation) had a hardness of 70 to 75. Accordingly, a bar soap having a hardness of from about 70 to about 95 may be regarded as having a suitable hardness.

4. Solidifying speed

[0044] In the course of producing a bar soap in the same manner as in "3. Hardness of bar soap" in which the soap composition was poured into a mold cavity and then air cooled at 25°C, a hardness of the resulting bar soap was measured 30 min., 60 min. and 90 min. after the start of the cooling. The solidifying speed was evaluated according to the following ratings:

A: No further change in hardness occurred after 30 to 60 min.

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B: No further change in hardness occurred after 60 to 90 min.

C: No further change in hardness occurred after 90 to 120 min.

In order to produce the soap with a higher efficiency, it is preferred that the solidification be completed within 60 min.

5. Stability of smell

[0045] The bar soap after cooling and solidification was taken out of the mold cavity and was placed in an aluminum pillow. After being hermetically sealed in the pillow, the bar soaps were respectively allowed to stand in thermostatic ovens maintained at 5°C and 50°C for one month. Thereafter, a change in smell between the bar soaps taken out of the respective thermostatic ovens was evaluated by expert panelists for smell according to the following ratings:

A: Slight change in smell between the bar soaps stored at 5°C and 50°C occurred, but no bad smell was recognized; the change was within an acceptable range.

B: Significant change in smell between the bar soaps stored at 5°C and 50°C occurred, but no bad smell was recognized the change was within an acceptable range.

C: Significant change in smell between the bar soaps stored at 5°C and 50°C occurred, and a bad smell was recognized; the change is out of an acceptable range.

6. Resistance to sogginess

[0046] The bar soap after cooling and solidification was taken out of the mold cavity and was placed on a soap dish, and allowed to stand in a thermostatic oven maintained at 40°C under 75% RH for 2 weeks. Thereafter, the soap was taken out of the thermostatic oven and then immediately evaluated for its appearance according to the following ratings:

A: No change in appearance occurred.

B: Slight sogginess occurred but it was within an acceptable range.

C: Sogginess occurred and the bar soap was deposited on the dish.

Examples 2 to 5 and Comparative Examples 1 to 9

[0047] Soap compositions were produced in the same manner as in Example 1 except for using the formulations as shown in Table 1. Evaluation was also made by the same method as used in Example 1. The results are shown in Table 1.

[0048]

TABLE 1-1

Examples			1	2	3	4	5
Component (A) Fatty acid composition (% by weight)	Lauric acid (C ₁₂)		9	10	12	10.3	7
	Myristic acid (C ₁₄)		9	10	4.5	10.3	7
	Palmitic acid (C ₁₆)		4.5	3.5	7	5.2	7.4
	Stearic acid (C ₁₈)		4.5	6.5	8.6	5.2	7.4
	Isostearic acid (branched C ₁₈)		-	-	-	-	-
	Neutralizing agent (% by weight)	48% Sodium hydroxide	10.6	11.9	11.7	11.3	10.2

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(continued)

Examples			1	2	3	4	5
Component (B) (% by weight)	Polyhydric alcohol (liquid)	Isoprene glycol	10	14	9	10	10
		Propylene glycol	-	-	9	8	10
		Glycerin	-	-	-	-	2
	Saccharide (solid)	Xylitol	10	9	9	10	10
		Sorbitol	10	12	5.9	5.2	14
	Nonionic surfactant	Eater *1		6	9	10	6
		Ether *2	9	-	-	-	-
	Amphoteric surfactant	Betaine *3	-	1.7	-	-	-
Component (C): inorganic salt (% by weight)		Sodium chloride	1.1	1.1	1	0.5	1.2
(D) Purified water (% by weight)			balance	balance	balance	balance	balance
Total amount (% by weight)			100	100	100	100	100
*1: POE (20) sorbitan lauric acid ester *2: POE (20) octyldodecyl ether *3: Lauryl hydroxysulfobetaine							

TABLE 1-2

Comparative Examples			1	2	3	4	5
Fatty acid composition of Component (A) (% by weight)	Lauric acid (C ₁₂)		4	9	18	9	9
	Myristic acid (C ₁₄)		20	7.5	0	15	1
	Palmitic acid (C ₁₆)		2.9	2.9	9	2.9	9.2
	Stearic acid (C ₁₈)		1.1	1.1	9	1.1	8.8
	Isostearic acid (branched C ₁₈)		-	7.5	-	-	-
	Neutralizing agent (% by weight)	48% Sodium hydroxide	10.5	13.2	12.8	12	12.7
Component (B) (% by weight)	Polyhydric alcohol (liquid)	Isoprene glycol	10	10	10	20	10
		Propylene glycol	-	-	-	-	-
		Glycerin	-	-	-	-	10
	Saccharide (solid)	Xylitol	10	10	10	-	10
		Sorbitol	10	10	10	-	10
	Nonionic surfactant	Ester *1	9	6	-	6	6
		Ether *2	-	-	9	-	-
	Amphoteric surfactant	Betaine*3	-	-	-	-	-
Component (C): inorganic salt (% by weight)		Sodium chloride	1.1	1.1	1.1	1.2	1.2
(D) Purified water (% by weight)			balance	balance	balance	balance	balance
Total amount (% by weight)			100	100	100	100	100

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TABLE 1-3

Comparative Examples			6	7	8	9
Fatty acid composition of	Lauric acid (C ₁₂)		9	10.3	7.1	7.5
	Myristic acid (C ₁₄)		9	10.3	8	7.5
	Palmitic acid (C ₁₆)		4.5	5.2	8.7	4
Component(A) (% by weigh)	Stearic acid (C ₁₈)		4.5	5.2	8.7	4
	Isostearic acid (branched C ₁₈)		-	-	-	-
	Neutralizing agent (% by weight)	48% Sodium hydroxide	10.6	11.3	11.4	8.4
Component(B) (% by weight)	Polyhydric alcohol (liquid)	Isoprene glycol	10	10	12.5	10
		Propylene glycol	-	8	-	5
		Glycerin	-	-	-	5
	Saccharide (solid)	Xylitol	10	10	9.3	10
		Sorbitol	10	5.2	8.1	15
	Nonionic surfactant	Ester *1	9	10	5.6	-
		Ether *2	-	-	-	10
	Amphoteric surfactant	Betaine *3	-	-	1.9	2
Component (C): inorganic salt (% by weight)		Sodium chloride	0	0.3	1.1	1.2
(D) Purified water (% by weight)			balance	balance	balance	balance
Total amount (% by weight)			100	100	100	100

TABLE 1-4

Examples		1	2	3	4	5
Total amount of C ₁₂ fatty acid and C ₁₄ fatty acid (% by weight of fatty acids)		18	20	16.5	20.6	14
C ₁₂ Fatty : C ₁₄ fatty acid (weight ratio between fatty acids)		50:50	50:50	73:27	50:50	50:50
C ₁₂ Fatty : (C ₁₄ + C ₁₈) fatty acids (weight ratio between fatty acids)		50:50	50:50	43:57	50:50	32:68
Total amount of component (A) (in terms of fatty acids)		27	30	32.1	31	28.8
(Component(A) (in terms of fatty acids)): component (B) (weight ratio)		41:59	41:59	43:57	42:58	38:62
Total amount of component (B)		39	42.7	41.9	43.2	52
Results of evaluation	Transparency (L value)	33.9	33.9	36	38	33
	Foamability (hardness 4 hard water) (mm)	21	23	22	21	22
	Hardness of soap	81	81	75	79	75
	Solidifying speed	A	A	A	A	A
	Stability of smell	A	A	A	A	A
	Resistance to sogginess	A	A	A	A	A

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TABLE 1-5

Comparative Examples		1	2	3	4	5
Total amount of C ₁₂ fatty acid and C ₁₄ fatty acid (% by weight of fatty acids)		24	16.5	18	24	10
C ₁₂ Fatty : C ₁₄ fatty acid (weight ratio between fatty acids)		17:83	55:45	100:0	38:62	90:10
C ₁₂ Fatty : (C ₁₄ + C ₁₈) fatty acids (weight ratio between fatty acids)		50:50	69:31	50:50	69:31	33:67
Total amount of component (A) (in terms of fatty acids)		28	28	36	28	28
(Component(A) (in terms of fatty acids)) : component (B) (weight ratio)		42:58	44:56	48:52	58:42	38:62
Total amount of component (B)		39	36	39	26	46
Results of evaluation	Transparency (L value)	70	45	33	86	33
	Foamability (hardness 4 hard water) (mm)	18	21	10	21	10
	Hardness of soap	85	60	80	75	86
	Solidifying speed	A	B	A	A	A
	Stability of smell	A	C	A	A	A
	Resistance to sogginess	A	B	B	A	A

TABLE 1-6

Comparative Examples		6	7	8	9
Total amount of C ₁₂ fatty acid and C ₁₄ fatty acid (% by weight of fatty acids)		18	20.6	15.1	15
C ₁₂ Fatty : C ₁₄ fatty acid (weight ratio between fatty acids)		50:50	50:50	47:53	50:50
C ₁₂ Fatty : (C ₁₄ + C ₁₈) fatty acids (weight ratio between fatty acids)		50:50	50:50	29:61	50:50
Total amount of component (A) (in terms of fatty acids)		27	31	32.5	23
(components (in terms of fatty acids)) : component (B) (weight ratio)		41:59	42:58	46:54	29:71
Total amount of component (B)		39	43.2	37.4	57
Results of evaluation	Transparency (L value)	33	36	50	36
	Foamability (hardness 4 hard water) (mm)	15	17	20	18
	Hardness of soap	75	75	85	40
	Solidifying speed	B	B	A	C
	Stability of smell	A	A	A	A
	Resistance to sogginess	C	B	A	C

Examples 6 to 15

[0049] The soap compositions having the following formulations were produced in the same manner as in Example 1. The resulting soaps showed good evaluation results similar to those in Example 1.

Example 6

[0050]

Transparent soap	% by weight
Lauric acid (C ₁₂)	2.8
Myristic acid (C ₁₄)	11.2

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(continued)

Transparent soap	% by weight
Palmitic acid (C ₁₆)	0.9
Stearic acid (C ₁₈)	0.9
48% Sodium hydroxide	5.8
Isoprene glycol	10
Xylitol	9.3
Sodium chloride	1.1
Purified water	balance
Total	100

Example 7

[0051]

Transparent soap	% by weight
Lauric acid (C ₁₂)	2.8
Myristic acid (C ₁₄)	11.2
Palmitic acid (C ₁₆)	3.5
Stearic acid (C ₁₈)	3
48% Sodium hydroxide	7.2
Isoprene glycol	10
Propylene glycol	10
Xylitol	10
POE (20) sorbitan lauric acid ester	10
Lauryl hydroxysulfobetaine	7.8
Sodium chloride	1.2
Purified water	balance
Total	100

Example 8

[0052]

Transparent soap	% by weight
Lauric acid (C ₁₂)	2.8
Myristic acid (C ₁₄)	11.2
Palmitic acid (C ₁₆)	3.5
Stearic acid (C ₁₈)	3
48% Sodium hydroxide	7.2
Isoprene glycol	10
Xylitol	10
POE (20) sorbitan lauric acid ester	5
Sodium chloride	1.4
Purified water	balance
Total	100

Example 9

[0053]

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Transparent soap	% by weight
Lauric acid (C ₁₂)	11.2
Myristic acid (C ₁₄)	2.8
Palmitic acid (C ₁₆)	6.1
Stearic acid (C ₁₈)	6
48% Sodium hydroxide	9.4
Isoprene glycol	10
Xylitol	10
POE (20) sorbitan lauric acid ester	10
Lauryl hydroxysulfobetaine	1.9
Sodium chloride	1.3
Purified water	balance
Total	100

Example 10

[0054]

Transparent soap	% by weight
Lauric acid (C ₁₂)	11.2
Myristic acid (C ₁₄)	2.8
Palmitic acid (C ₁₆)	6.1
Stearic acid (C ₁₈)	6
48% Sodium hydroxide	9.4
Isoprene glycol	10
Propylene glycol	10
Xylitol	10
POE (20) sorbitan lauric acid ester	10
POE (20) octyldodecyl ether	10.9
Lauryl hydroxysulfobetaine	10
Sodium chloride	1.2
Purified water	balance
Total	100

Example 11

[0055]

Transparent soap	% by weight
Lauric acid (C ₁₂)	5.5
Myristic acid (C ₁₄)	16.5
Palmitic acid (C ₁₆)	6.1
Stearic acid (C ₁₈)	6
48% Sodium hydroxide	9.4
Isoprene glycol	10
Propylene glycol	10
Xylitol	10
POE (20) sorbitan lauric acid ester	10
POE (20) octyldodecyl ether	10.9
Lauryl hydroxysulfobetaine	10
Sodium chloride	1.2

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(continued)

	Transparent soap	% by weight
	Purified water	balance
5	Total	100

Example 12

10 **[0056]**

	Transparent soap	% by weight
	Lauric acid (C ₁₂)	5.5
	Myristic acid (C ₁₄)	16.5
15	Palmitic acid (C ₁₆)	6
	Stearic acid (C ₁₈)	6.8
	48% Sodium hydroxide	12.2
	Isoprene glycol	10
	Xylitol	10
20	POE (20) sorbitan lauric acid ester	10
	POE (20) octyldodecyl ether	10
	Lauryl hydroxysulfobetaine	2
	Sodium chloride	1.3
25	Purified water	balance
	Total	100

Example 13

30 **[0057]**

	Transparent soap	% by weight
	Lauric acid (C ₁₂)	16.5
35	Myristic acid (C ₁₄)	5.5
	Palmitic acid (C ₁₆)	5.5
	Stearic acid (C ₁₈)	5.5
	48% Sodium hydroxide	12.2
	Isoprene glycol	10
40	Propylene glycol	3
	Xylitol	10
	POE (20) sorbitan lauric acid ester	10
	POE (20) octyldodecyl ether	10
45	Sodium chloride	1.5
	Purified water	balance
	Total	100

Example 14

50 **[0058]**

	Transparent soap	% by weight
55	Lauric acid (C ₁₂)	4
	Myristic acid (C ₁₄)	12
	Palmitic acid (C ₁₆)	4.5
	Stearic acid (C ₁₈)	4.5

(continued)

	Transparent soap	% by weight
	48% Sodium hydroxide	8.8
5	Isoprene glycol	10
	Xylitol	10
	POE (20) sorbitan lauric acid ester	10
	Sodium chloride	1.3
10	Purified water	balance
	Total	100

Example 15

15 [0059]

	Transparent soap	% by weight
	Lauric acid (C ₁₂)	9
20	Myristic acid (C ₁₄)	9
	Palmitic acid (C ₁₆)	8
	Stearic acid (C ₁₈)	6
	48% Sodium hydroxide	12.2
	Isoprene glycol	10
25	Xylitol	10
	POE (20) sorbitan lauric acid ester	10
	Lauryl hydroxysulfobetaine	2.7
	sodium chloride	1.4
30	Purified water	balance
	Total	100

Industrial Applicability

35 [0060] According to the present invention, there is obtained a transparent bar soap which has a high transparency, a good foamability especially in hard water and a suitable hardness necessary for bar soaps, and which is free from problems concerning deterioration of its smell over time. The transparent bar soap can be easily produced for a short period of time by a casting method, etc., i.e., only by pouring a molten soap composition into a mold cavity having a desired shape and then cooling the poured composition. Thus, molded bar soap products having a desired shape can
40 be produced with a high productivity.

Claims

- 45 1. A transparent bar soap comprising (A) saturated straight-chain fatty acids having 12 to 18 carbon atoms and/or salts thereof and is substantially free from a branched fatty acid salt and an unsaturated fatty acid salt, said transparent bar soap further comprising (B) one or more substances selected from the group consisting of nonionic surfactants, amphoteric surfactants, polyhydric alcohols which are kept in a liquid state at a room temperature, and saccharide, (C) an inorganic salt, and (D) water,
- 50 wherein the fatty acids constituting the component (A) are present in an amount of from 20 to 40% by weight on the basis of the entire amount of the bar soap, the components (A) and (B) are present in such an amount that a weight ratio of the fatty acids constituting the component (A) to the component (B) is from 30:70 to 45:55, the component (C) is present in an amount of from 0.5 to 5% by weight on the basis of the entire amount of the bar soap, and the component (D) is present in a remainder amount of the bar soap, and
- 55 wherein C₁₂, C₁₄, C₁₆ and C₁₈ fatty acids constituting the component (A) are present in such an amount that a weight ratio of the C₁₂ fatty acid to a sum of the C₁₆ fatty acid and the C₁₈ fatty acid is in the range of from 30:70 to 60:40, a weight ratio of the C₁₂ fatty acid to the C₁₄ fatty acid is in the range of from 20:80 to 80:20, and a total amount of the C₁₂ fatty acid and the C₁₄ fatty acid is from 14 to 22% by weight on the basis of the entire amount of

the bar soap.

2. The transparent bar soap according to claim 1, wherein the component (B) is present in an amount of from 20 to 50% by weight on the basis of the entire amount of the bar soap.
3. The transparent bar soap according to claim 1 or 2, wherein the component (D) is present in an amount of from 10 to 40% by weight on the basis of the entire amount of the bar soap.
4. A process for producing a transparent bar soap from a soap composition which comprises (A) saturated straight-chain fatty acids having 12 to 18 carbon atoms and/or salts thereof, (B) one or more substances selected from the group consisting of nonionic surfactants, amphoteric surfactants, polyhydric alcohols which are kept in a liquid state at a room temperature, and saccharides, (C) an inorganic salt, and (D) water, wherein the fatty acids constituting the component (A) are present in an amount of from 20 to 40% by weight on the basis of the entire amount of the soap composition, wherein C_{12} , C_{14} , C_{16} and C_{18} fatty acids constituting the component (A) are present in such an amount that a weight ratio of the C_{12} fatty acid to a sum of the C_{16} fatty acid and the C_{18} fatty acid is in the range of from 30:70 to 60:40, a weight ratio of the C_{12} fatty acid to the C_{14} fatty acid is in the range of from 20:80 to 80:20, and a total amount of the C_{12} fatty acid and the C_{14} fatty acid is from 14 to 22% by weight on the basis of the entire amount of the soap composition, and wherein the components (A) and (B) are present in such an amount that a weight ratio of the fatty acids constituting the component (A) to the component (B) is from 30:70 to 45:65, the component (C) is present in an amount of from 0.5 to 5% by weight on the basis of the entire amount of the soap composition, and the component (D) is present in a remainder amount of the bar soap, said process comprising the steps of heating and melting the soap composition to obtain a homogeneous composition, pouring the homogeneous composition into a mold, and cooling and solidifying the poured composition to obtain a molded bar soap.
5. The process for producing a transparent bar soap according to claim 4, wherein the component (D) is present in an amount of from 10 to 40% by weight on the basis of the entire amount of the soap composition.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2008/060393

A. CLASSIFICATION OF SUBJECT MATTER <i>C11D9/04</i> (2006.01) i, <i>A61K8/36</i> (2006.01) i, <i>A61Q19/10</i> (2006.01) i, <i>C11D9/10</i> (2006.01) i, <i>C11D9/22</i> (2006.01) i According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) <i>C11D9/04</i> , <i>A61K8/36</i> , <i>A61Q19/10</i> , <i>C11D9/10</i> , <i>C11D9/22</i> Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2008 Kokai Jitsuyo Shinan Koho 1971-2008 Toroku Jitsuyo Shinan Koho 1994-2008 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	JP 2002-80896 A (P & PF Co., Ltd.), 22 March, 2002 (22.03.02), Claims 1, 2; Par. No. [0047] (Family: none)	1-5
☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 05 August, 2008 (05.08.08)		Date of mailing of the international search report 19 August, 2008 (19.08.08)
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2008/060393

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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