

Composition and Method

The present invention relates to novel surfactant compositions and to methods and uses relating thereto.

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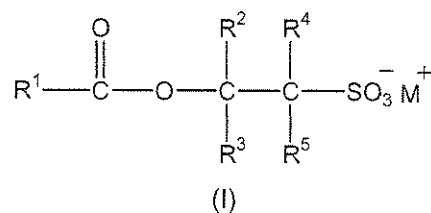
Modern personal care compositions, for example shampoos, conditioners, cleansers, body washes, shower gels, moisturisers and the like are aqueous compositions comprising blends of surfactants and conditioning agents. Personal care formulations are usually prepared by mixing individual surfactants and conditioning agents. The components may be supplied as concentrated solutions which are diluted and/or combined in appropriate ratios by the formulator. Favoured concentrated components are those which are easy to handle and readily flow and thus can be pumped easily. However to enable a readily flowable composition to be provided the concentration of a particular ingredient is sometimes limited to prevent the formation of a viscous gel or a waxy solid. As a result surfactant concentrates comprising relatively high levels of water are often used as component ingredients in personal care compositions. Such concentrated compositions then need to be transported to various locations worldwide for use in formulation plants. This results in significant volumes of water being transported long distances which is disadvantageous from a cost and environmental perspective.

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It would thus be advantageous if more concentrated flowable surfactant compositions could be provided. It would also be beneficial if concentrates including a mixture of surfactants could be supplied as this would reduce the need to transport a plurality of individual components.

According to a first aspect of the present invention there is provided a stable flowable aqueous composition comprising at least two component surfactants, each component surfactant having a maximum solubility in water at which a saturated solution forms, wherein the total concentration of all surfactants present in the composition is greater than would be obtained by combining equivalent amounts of saturated solutions of the component surfactants; wherein at least one component surfactant includes a compound of formula (I):

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wherein R^1 represents a C_{4-36} substituted or unsubstituted hydrocarbyl group;

each of R^2 , R^3 , R^4 and R^5 independently represents a hydrogen atom or a C_{1-4} alkyl group and wherein at least one of R^2 , R^3 , R^4 and R^5 is not hydrogen; and

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M^+ represents a cation; and

wherein the composition comprise less than 65 wt% water.

5 In another aspect, there is provided a stable flowable aqueous composition comprising at least two component surfactants and having a volume V which comprises a plurality n of surfactants wherein a first surfactant is present in an amount having a mass m_1 and has a maximum solubility S_1 , a second surfactant is present in an amount having a mass m_2 and has a maximum solubility S_2 ; and an nth surfactant (when present) is present in an amount having a mass m_n and has a maximum solubility S_n , wherein

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$$V < \frac{m_1}{S_1} + \frac{m_2}{S_2} + \dots \frac{m_n}{S_n}$$

In yet another aspect, there is provided the use of a composition as defined above in the preparation of a personal care composition.

15 In still another aspect, there is provided a method of preparing a personal care composition, the method comprising diluting a composition as defined above to provide a desired final concentration of component surfactants.

20 For the avoidance of doubt when referring to an equivalent amount of saturated solution of component surfactant we mean that, as an example, if a composition of the present invention comprises 10g of surfactant A and 10g of surfactant B then combining a saturated solution containing 10g of surfactant A and a saturated solution comprising 10g of surfactant B would result in a composition having a lower concentration than the composition of the present invention. The skilled person will appreciate that this means that compositions of the present
25 invention have a lower volume for a given mass of surfactant mixture compared with that which would be obtained by mixing saturated solutions.

30 Thus if a composition of the present invention has a volume V and comprises a plurality n of surfactants wherein a first surfactant is present in an amount having a mass m_1 , and has a maximum solubility in water S_1 , a second surfactant is present in an amount having a mass m_2 and has a maximum solubility in water S_2 ; and an nth surfactant (when present) is present in an amount having a mass m_n and has a maximum solubility in water S_n , then

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$$V < \frac{m_1}{S_1} + \frac{m_2}{S_2} + \dots \frac{m_n}{S_n}$$

The maximum solubility in water values refer to the saturation solubility of that component surfactant when no other surfactant or other ingredient is present. Some impurities may be present as commercially available surfactants often contain impurities but the values of S_1 , S_2 and S_3 refer to the maximum solubility of the active surfactant present.

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Preferably n is less than 10, preferably less than 6. Suitably n may be 2, 3, 4 or 5. In a preferred embodiment n is 2.

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The composition of the present invention comprises a greater total concentration of surfactant C than would be obtained by combining saturated solutions of the component surfactants.

$$\text{The total concentration } C = \frac{m_1 + m_2 + \dots m_n}{V}$$

and thus $C > \frac{m_1 + m_2 + \dots m_n}{S_1 + S_2 + \dots S_n}$

$$\left(\frac{m_1}{S_1} + \frac{m_2}{S_2} + \dots \frac{m_n}{S_n} \right)$$