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Surface active compositions.

Compositions comprising a salt of an alcohol ether sulphate can be diluted without undue problems due to gel formation if a suitable quantity of a compound of molecular weight 500 to 10,000 which comprises at least one polyalkylene glycol chain, the compound comprising at least two ether linkages per seven carbon atoms is present.

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Surface Active Compositions

THIS INVENTION relates to surface active compositions.

Alcohol ether sulphate salts of which the anion
5 has the formula $[\text{RO}(\text{C}_2\text{H}_4\text{O})_n\text{SO}_3]^-$ where R is an alkyl group having 10 to 20 and preferably 12 to 16 carbon atoms and n is an integer in the range 1 to 7 and preferably 1 to 4 are known surface active agents which are used in, for example shampoos, liquid dishwashing
10 liquids etc.

They are normally produced by ethoxylating an appropriate alcohol, reacting the product with a sulphating agent for example H_2SO_4 , SO_3 or SO_2Cl_2 and neutralising with an amine for example a C_1 to C_5 mono
15 alkyl amine or ammonia or with an alkali or alkaline earth base or ammonium compound to give the salt which is normally produced as a concentrate containing for example 65 to 75% by weight of the salt and a minor amount of water which includes any water of neutralisation and any
20 introduced as solvent for the neutralising agent. Such concentrates are normally viscous liquids, but if free inorganic sulphates, for example sodium sulphate, or the unsulphated alcohol ethoxylate is present the concentrate may become an elastic gell which is difficult to handle.

25 The alcohol ether sulphate salts are normally transported as concentrates and then diluted with water and optionally other materials to produce the product ultimately used by the consumer. On dilution of the concentrate another gell of a particularly troublesome
30 type is encountered when a composition of about 55% of the alcohol ether sulphate salt and 45% of water is reached. Frequently ethanol is added to break the gells and allow dilution, but this represents a considerable expense and because of its volatility, a fire hazard.

35 We have found that the addition of a compound (other than a sulphate or sulphate salt) of average molecular weight 500 to 10,000, preferably 500 to 6,000 and more preferably 1,000 to 3,000, which comprises at

least one polyalkylene glycol chain, the compound comprising a total of at least two ether linkages per seven carbon atoms, for example a polyethylene glycol of average molecular weight 500 to 6,000 reduces the problem of dilution with water. The said compounds are of low volatility, and the quantities required are small.

The invention comprises a composition comprising a salt of an alcohol ether sulphate of formula $[RO(C_2H_4O)_nSO_3]^- M^{m+}$ where R and n are as previously defined, M is an ammonium, substituted ammonium, alkali or alkaline earth metal ion and m is the valency of M, and a gel inhibiting quantity of a compound (other than a sulphate or sulphate salt) of average molecular weight 500 to 10,000, preferably 500 to 6,000 and more preferably 1,000 to 3,000, which comprises at least one polyalkylene glycol chain, the compound comprising a total of at least two ether linkages per seven carbon atoms, for example a polyethylene glycol.

The compound may be a polyalkylene or mixed polyalkylene glycol, for example polyethylene glycol or a mixed polyethylene/polypropylene glycol, a compound comprising a polyalkylene glycol chain linked to a phenol or alcohol for example an alkyl phenol (suitably having 4 to 12 carbon atoms in its alkyl group or groups) or alcohol (suitably having 1 to 16 and preferably 10 to 16 carbon atoms)/ethylene oxide condensate or with two or more polyalkylene glycol chains linked to a residue of a compound having two or more active hydrogen atoms, for example, glycerol or butane 1,4 diol. The compound is very suitably a polyethylene glycol.

By a gel inhibiting quantity is meant an amount sufficient to reduce the maximum elasticity of any gel encountered during dilution with water to at most 4×10^{-4} Newtons per sq mm and preferably at most 1×10^{-4} Newtons. In general 0.5 to 5% by weight of polyethylene glycol is used. Compositions according to the invention tend to be thixotropic; they are readily pumpable in suitable conventional equipment.

The salt is suitably a sodium, potassium, magnesium or ammonium salt, and may be produced by neutralising the acid with a hydroxide, carbonate or bicarbonate of the cation. Direct neutralisation with ammonia or an amine may be carried out.

The invention also comprises a process in which the alcohol ether sulphate salt is mixed with a gel inhibiting amount of a compound (other than a sulphate or sulphate salt) of average molecular weight 500 to 10,000, preferably 500 to 6,000 and more preferably 1,000 to 3,000, which comprises at least one polyalkylene glycol chain, the compound comprising a total of at least two ether linkages per seven carbon atoms, for example a polyethylene glycol, and then diluted with water.

Preferably the compound has at least two ether linkages per five carbon atoms.

EXAMPLE

A sodium salt of a mixed C_{13} and C_{15} alcohol (7 to 3 by molar ratio) ethoxylated with an average of 3 mole C_2H_4O per mole of alcohol, sulphated with SO_3 and neutralised with NaOH solution to produce a 70% mixture by weight of the salt with water (hereinafter referred to as material A) was tested in an oscillating can rheometer to determine its dynamic viscosity and elasticity at a frequency of oscillation of 9.8 cycles per second. Material A with the specified additives was also tested in the same way.

The elasticity of Material A was 745 Nm^{-2} and its dynamic viscosity at 25°C at low shear was 39.5 poise.

Material A with 2.5% w/w of polyethylene glycol (800 mol wt) added had a dynamic viscosity under the same conditions of 37 poise at low shear and an elasticity of $3.2 \times 10^{-4} \text{ N mm}^{-2}$.

Material A with 1% w/w polyethylene glycol (1,000 mol wt) added had a dynamic viscosity under the same conditions of 34 poise at low shear and an elasticity of $4.1 \times 10^{-4} \text{ N mm}^{-2}$.

Material A with $2\frac{1}{2}$ w/w polyethylene glycol (1,000 mol wt) added had a dynamic viscosity under the same conditions of 36 poise at low shear and an elasticity of 2.1×10^{-4} N mm⁻².

5 The performance of other additives in material A is shown in the following table.

Additive	Concentration % w/w	Viscosity (poise)	Elasticity N mm ⁻²
10 Condensate of Butane 1-4 Diol with Ethylene Oxide			
900 MW	2	45.8	2.390×10^{-4}
1100 MW	2	45.2	2.070×10^{-4}
15 1600 MW	2	45.7	2.730×10^{-4}
2100 MW	2	49.4	3.070×10^{-4}
Polyethylene glycol MW 1500	2	42.1	2.220×10^{-4}
"Synperonic" A50	2	46.4	3.030×10^{-4}
20 "Synperonic" OP40	2	52.9	3.250×10^{-4}
Methoxy poly-ethylene glycol MW 1,500	2	37	2.100×10^{-4}
"Synperonic" TLE	2	48	2.700×10^{-4}

25 "Synperonic" TLE is a commercial product produced by alkoxyating methanol. It contains 28 ether links per 63 carbon atoms and has a molecular weight of 1,400.

"Synperonic" A50 is a commercial product produced by condensing a mixed C₁₃ and C₁₅ alcohol
30 (7 to 3 by molar ratio) with c. 50 moles of ethylene oxide per mole.

"Synperonic" OP40 is a product of condensing octyl phenol with c. 40 moles of ethylene oxide per mole.

M.W. means molecular weight.

35 Materials with the additives all diluted much more readily with water than the pure material. The time required for comparable dilutions was substantially less,

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for example one tenth, and no problems were encountered with gel formation during dilution.

Claims

1. A composition which comprises a salt of an alcohol ether sulphate of formula $\left[RO(C_2H_4O)_nSO_3\right]_m^{m+}$ where R and n are as previously defined, M is an ammonium, substituted ammonium, alkali or alkaline earth metal ion and m is the valency of M, and a gel inhibiting quantity of a compound (other than a sulphate or sulphate salt) of average molecular weight 500 to 10,000, preferably 500 to 6,000 and more preferably 1,000 to 3,000 which comprises at least one polyalkylene glycol chain, the compound comprising a total of at least two ether linkages per seven carbon atoms.
2. A composition as claimed in Claim 1 in which the compound of average molecular weight 500 to 10,000 is a polyethylene glycol.
3. A composition as claimed in Claim 2 in which the polyethylene glycol has an average molecular weight of 500 to 6,000.
4. A composition as claimed in any preceding claim in which 0.5 to 5% by weight of polyethylene glycol is present.
5. A composition as claimed in any preceding claim in which the salt of the alcohol ether sulphate is a sodium, potassium, magnesium or ammonium salt.
6. A composition as claimed in any preceding claim in which R is an alkyl group having 12 to 16 carbon atoms and n is an integer in the range 1 to 4.
7. A process in which an alcohol ether sulphate salt of which the anion has the formula $\left[RO(C_2H_4O)_nSO_3\right]^-$ where R is an alkyl group having 10 to 20 carbon atoms and n is an integer in the range 1 to 7 is mixed with a gel inhibiting amount of a compound (other than a sulphate or sulphate salt) of average molecular weight 500 to 10,000 which comprises at least one polyalkylene glycol chain, the compound comprising a total of at least two ether linkages per seven carbon atoms, and is then diluted with water.



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EUROPEAN SEARCH REPORT

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Application Number

EP 82 30 0640.8

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<u>FR - A1 - 2 216 346</u> (COLGATE-PALMOLIVE CO.) * claims 1, 4 * & US - A - 4 304 680 ---		C 11 D 1/29 C 11 D 1/14
A	<u>FR - A1 - 2 198 992</u> (PROCTER & GAMBLE EUROPEAN TECHNICAL CENTER) * claim 5; page 22, example 12 * & US - A - 3 963 649 ---		TECHNICAL FIELDS SEARCHED (Int.Cl. 3)
A	<u>GB - A - 2 054 635</u> (KAO SOAP CO. LTD.) * page 9, table 1 * ----		C 11 D 1/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons
			&: member of the same patent family, corresponding document
☒ The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
Berlin	19-03-1982	SCHULTZE	