

## UNITED STATES PATENT OFFICE

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## DIALKYL SULFOSUCCINATE COMPOSITION

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This invention relates to surface-active compositions, and more particularly to compositions containing surface-active dialkyl sulfosuccinates in which the alkyl groups contain from 5-10 carbon atoms prepared in the form of dry, water-soluble powders by admixture with a hardening agent.

The diesters of sulfosuccinic acid with alcohols of 5-10 carbon atoms are well-known wetting and emulsifying agents, their preparation being described in U. S. Patent No. 2,028,091. Of these compounds the di-(2-ethyl-hexyl) sulfosuccinate, in the form of its sodium or other alkali metal salt, possesses the highest wetting power as measured by the standard Draves test. The diamyl sodium sulfosuccinate and the dihexyl sodium sulfosuccinate are somewhat more easily soluble in water than is the dioctyl compound, and all three are sold commercially in large quantities. The dinonyl and didecyl sodium sulfosuccinates are at present used principally as emulsifying agents and detergents, although they are also good wetting agents.

Heretofore these wetting agents have been sold commercially either as solutions in water or aqueous organic solvents or in admixture with inert organic or inorganic diluents or in pure 100% form. The solutions are used where the surface-active agent is desired in a quickly water-soluble form, but require special containers of glass, stainless steel or aluminum as well as the shipment and storage of substantial quantities of solvent. The dry powders usually contain about 10-20% of the dialkyl sulfosuccinate in admixture with 80-90% of an inert diluent such as cerelose or sodium sulfate. These dry mixtures are water-soluble and free-flowing, but also necessitate the shipment and storage of large quantities of diluent material.

In their pure or 100% form the dialkyl sulfosuccinates of aliphatic alcohols of 5-10 carbon atoms are solid waxes which dissolve very slowly in water. For example, pure sodium dioctyl sulfosuccinate must be allowed to stand in water at room temperature for 24 hours to prepare a 10% solution. As is noted above, the diamyl and dihexyl esters dissolve in water more rapidly than the dioctyl ester, but are considerably more hygroscopic.

Heretofore the only known method of overcoming the inherent stickiness and slow water-dispersibility of the dialkyl sulfosuccinates was to mix them with relatively large quantities of organic or inorganic diluents such as sugars or sodium sulfate. However, as noted above, this

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method required the use of considerably more diluent than wetting agent. The present invention is based on the discovery of a hardening agent which will overcome the inherent stickiness of the dialkyl sulfosuccinates even when used in relatively small quantities.

I have found that the alkali metal salts of benzoic acid, such as sodium, potassium or ammonium benzoates, will transform the normally sticky dialkyl sulfosuccinates of alcohols of 5-10 carbon atoms into hard, brittle materials that are readily powdered after drying. The alkali metal benzoates are effective for this purpose even when used in relatively small amounts; thus, for example, the addition of 5-10 parts by weight of sodium benzoate to 90-95 parts of sodium dioctyl sulfosuccinate will change the sulfosuccinate from its normal waxy consistency into a non-sticky solid that can be dissolved in water in less than 5 minutes. When the same proportion of sodium benzoate is added to a concentrated aqueous solution of sodium dioctyl sulfosuccinate the resulting mixture can be spray-dried. This is an extremely important discovery, for previous spray-dried compositions of the dialkyl sulfosuccinate wetting agents have always contained more than 50% and usually about 90-95% of inert diluent.

The compositions of my invention therefore contain, as essential ingredients, a dialkyl ester of sulfosuccinic acid in which the alkyl radicals contain 5-10 carbon atoms together with an alkali metal salt of benzoic acid. The compositions may also contain other ingredients if desired such, for example, as sodium phosphate, soap, other detergents, inorganic fillers and the like. The alkali metal benzoate should be present in amounts of at least 5%, based on the weight of the dialkyl sulfosuccinate; but larger quantities may be and usually are employed. In general, the amount of alkali metal benzoate will vary from about 5% to about 50%, based on the weight of the dialkyl sulfosuccinate, although amounts up to 100% may be employed if desired. Quantities of 15-60% are frequently advantageous, for the increased amounts of alkali metal benzoate causes even more rapid solution of the dialkyl sulfosuccinate in water, and produces a quickly dispersible composition.

The compositions of my invention are preferably prepared by mixing the dialkyl sulfosuccinate with the alkali metal benzoate in the presence of an aqueous solvent which may be water or a mixture of water and ethanol, propanol, butanol, etc., followed by evaporating the solution to dryness. Drying may be effected in a tray drier

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or on a revolving drum, from which the solid material is continuously scraped in the form of thin flakes. However, I greatly prefer to reduce the solution to solid form by atomizing it into a spray drier, preferably of the type containing a rising vortex of hot air or hot products of combustion at 600°-700° F. By this method the product is obtained as a dry, non-caking, water-soluble powder.

As noted above, other detergents such as tetra sodium pyrophosphate or inert organic or inorganic materials such as disodium phthalate, cereose, or sodium sulfate may be dissolved in the aqueous solution containing the sodium benzoate and dialkyl sulfosuccinate, and are obtained as ingredients of the tray-dried, drum-dried or spray-dried products. However, it is an advantage of my invention that inert materials need not be used unless they are desired for special purposes since dry, free-flowing powders which are readily and rapidly soluble in water are obtained simply by mixing the alkali metal benzoate with the dialkyl sulfosuccinate.

In one typical example, 5 parts by weight of sodium benzoate and 23.5 parts of an 85% aqueous solution of sodium dioctyl sulfosuccinate were dissolved in 71.5 parts of water. The resulting solution was spray-dried in the above-described spray-drying equipment. The resulting dry, non-caking powder was readily water-soluble, and was

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well-suited for use in wetting out textiles, for the preparation of photographic film-developing powders, and for a wide variety of other uses requiring a water-soluble surface-active agent of high wetting power.

What I claim is:

1. A water-soluble composition consisting essentially of a dry mixture of 50% to 95% by weight of a dialkyl sulfosuccinate in which the alkyl groups contain from 5 to 10 carbon atoms and 50% to 5% by weight of an alkali metal benzoate.
2. A water-soluble composition consisting essentially of a dry mixture of 50% to 95% by weight of a dioctyl sulfosuccinate and 50% to 5% by weight of an alkali metal benzoate.
3. A water-soluble composition consisting essentially of a dry mixture of 50% to 95% by weight of a dialkyl sulfosuccinate in which the alkyl groups contain from 5 to 10 carbon atoms and 50% to 5% by weight of sodium benzoate.

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#### REFERENCES CITED

The following references are of record in the file of this patent:

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