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STRIPPER FOR FABRICS

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Our invention relates to a composition of matter intended for use as a color remover or stripper for dyed fabrics.

Due to the extensive practice of this art, both commercially and in households, there is a large and growing demand for a product that will accomplish the desired result in a satisfactory manner. The class of chemicals most generally used for this purpose is that known as sulphites, hydrosulphites and sulphoxylates. A most commonly used composition consists of a mixture of zinc dust and sodium bisulphite, which, in a water solution, evolves hydrogen and forms a chemical known as zinc hydrosulphite. A well known chemical of this class is sodium hydrosulphite of the general formula $Na_2S_2O_4$ known commercially in this country as lykopon, bleacan, decrolin, etc. This chemical, when boiled in water either alone or in the presence of an alkali or acid evolves hydrogen according to the equation: $Na_2S_2O_4$ and $2H_2O = 2NaHSO_3$ and H_2. This substance is sold in large quantities for stripping dyes and for reducing vat dyes in dyeing and tinting. The chemical is quite efficient, but is very unstable due to its capacity of absorbing oxygen and moisture from the air, resulting in the liberation of hydrogen. It is therefore necesary that the product be sold in sealed containers and that it be used promptly by the purchaser.

Many attempts have been made to obviate this difficulty and to stabilize the substance. In one instance the sodium hydrosulphite is combined with formaldehyde resulting in the formation of sodium hydrosulphite-formaldehyde, otherwise known as sodium sulphoxylate. This product is somewhat more stable than hydrosulphite alone but is not stable in a practical sense.

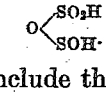
Another method of effecting stabilization is to form normal zinc salts known as zinc hydrosulphites or protoline or zinc sulphoxylate hydrosulphite. These represent an improvement over lykopon but they are not stable and must be isolated from air and moisture.

In view of the fact that all of the substances heretofore mentioned are water soluble, it has been proposed that a desired result might be secured by forming the insoluble derivatives, and zinc salts, known as basic zinc sulphoxylate hydrosulphite has been developed, otherwise known as "rongalite" or "formopon-extra". These substances are considerably more stable in air, due to the fact that they are insoluble in water. However, in order to use them, they must be used in an acid solution to neutralize the zinc salt and liberate the free acid. The result is a compound much weaker than straight sodium hydrosulphite. However, even these derivatives are not stable for indefinite periods in open air.

In order to merchandise a package product for household use it is difficult, if not impossible to provide hermetic sealing. For that reason, we have for some years marketed a product under Patent No. 1,524,737 consisting of a mixture of a hydrosulphite and a solid acid-reacting substance. This product is an improvement over the art but still not entirely satisfactory. It is for this reason that we have carried on a series of experiments looking forward to the development of a stripping substance that could be marketed in package form and that would be stable under all atmospheric conditions, and be completely soluble.

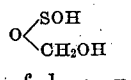
As the result of our experiments, we have found that the main reason for the decomposition of the hydrosulphite compounds was that the substance was hygroscopic and decomposes in the presence of air and moisture. We have, therefore, determined that if the hydrosulphite particles are enveloped in a water-proof or water-resistant film, the oxygen of the air, and moisture will be excluded and the substance will remain stable indefinitely.

In speaking of hydrosulphites, we include under that name all compounds that belong to this class. It may include the salts of hydro-sulfurous acid of the general formula

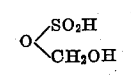


In also may include the different salts of the condensation product hydrosulfurous

acid or its salts with formaldehyde which have the following formula



or mixtures thereof, known as formaldehyde sulphoxalic acid and its salts, whether sodium, zinc, calcium, etc. and formaldehyde bisulphuric acid and its salts, the formula being



or mixtures thereof. These compounds are technically known as lykopon, which is sodium hydrosulphite, decrolin or protolin, which is zinc hydrosulphite-sulphoxylate, or formopon, which is sodium sulphoxylate formaldehyde or basic zinc sulphoxylate formaldehyde technically known as formopon-extra, rongalite, etc.

There are many other formulæ and many other technical means, but for brevity the substances are herein called hydrosulphites as they belong generally to the hydrosulfite class, the hypothetical hydrosulfurous acid being the parent substance of the whole class.

We have found that when sodium hydrosulphite or one of the derivatives heretofore mentioned is intimately mixed with an oily substance the product will remain stable even when it is exposed to the air for practically an indefinite period. An oily substance that will accomplish this result may be a hydrocarbon such as petrolatum, kerosene, or paraffine, or a metallic soap that is insoluble in water, such as aluminum stearate or even an ordinary anhydrous soap, such as sodium stearate, or sulphonated vegetable soap or a vegetable oil, such as castor oil, corn oil, or a sulphonated oil, or a fatty acid like oleic acid, stearic acid, sulphonated fatty acid, etc., or a naphthenic acid or a sulphonated petrolatum residue.

We have determined that when a quantity of any of the mentioned oily substances in excess of 2½% of the total amount of hydrosulphite, depending on the character of the oily substance, is intimately mixed therewith, an oily film is formed around each particle of the hydrosulphite thus providing an encasing envelope that serves to exclude air and moisture for practically an indefinite period.

A product such as described can be used in that form in operations where an aqueous solution is not necessary. However, where a water solution is required it will be found desirable to first supply to the water an agent that will serve to act on the oily substance, and release it from its intimate association with the hydrosulphite unless the oily substance itself is soluble or disperses in an excess of water. This will permit the hydrosulphite to enter into solution and to act in the expected manner.

An agent that will act as required may consist of a chemical that will serve to emulsify the oily substance with the water. An oily substance such as paraffine, oil, vegetable oil or wax may be emulsified by sulphonated soap, sulphonated oil, ordinary soap, neomerpin, which is a salt of a sulphonated alkylated polynuclear hydrocarbon, or sulphonated petroleum residues or sodium caseinate.

Or, the oily substance may be treated by a saponifying agent, such as an alkali like caustic soda, caustic potash, soda ash, borax, dry sodium phosphate, or ammonia, or derivatives that are suitable to form a soluble soap with a free fatty acid or an oil.

In either of the above cases, the oily substance is freed from the hydrosulphite and permitted to enter into solution or suspension. In the use of the saponifying agents particularly where an excess of alkali is used, there will be formed an alkaline solution that will assist in the stripping action.

However, in order that the product may be merchandized in packages for household use it is desirable that an agent be combined with the treated hydrosulphite having the capacity for reacting with or acting upon the oily substance only when the mixture is placed in an excess of water. The agent may have the capacity of emulsifying the oily substance and causing it to form an emulsion with the water, or it may react with the oily substance and saponify it. In either case, the oily substance is detached from the hydrosulphite and the hydrosulphite is permitted to enter into solution.

An essential of the mixture is that an agent shall be selected that will be dormant or inactive relative to the sulphite and its oily envelope so long as the compound remains in dry mixture.

To illustrate, a compound contemplated in the last named disclosure may consist of 90 grams of sodium hydrosulphite and 10 grams of petrolatum. These are first intimately mixed so that substantially every particle of the hydrosulphite receives a coating or envelope of the oil material. When this is accomplished we add 5–30 grams of iso-propyl naphthalene sodium sulphonate, or sodium caseinate, or sulphonated oil, or sodium ricinoleate or any similar agent having emulsifying properties. This compound is stable practically indefinitely and, when added to water, acts in the desired manner. We may also add chemicals to provide an acid or alkali reaction like soda ash or bisulphite of soda or we may add an inert substance such as salt.

In the event that a saponifiable oil or a fatty acid is used, the process is similar. In other words, the hydrosulphite is intimately mixed with the oily substance which may con-

sist of oleic acid, sulpholeic acid, castor oil, corn oil, sulphonated oil, stearic acid etc. Such a compound is useful without the addition of other substancess when used in a non-aqueous solvent.

It has been found to be advantageous to combine in solid mixture a quantity of soda ash, anhydrous borax, or ammonium carbonate in sufficient proportions to saponify the oil; or in a less proportion, in which case part of the oil may be saponified, thus forming a quantity of soap that will emulsify the remainder of the oil. Or we may prefer to utilize a substantially larger quantity of the saponifying agent, that is, more than sufficient to saponify the oil, in which case we provide an excess of alkali in the bath which will assist the hydrosulphite reaction.

In the compound last described, it may occur under extreme climatic conditions that there will be a limited reaction of the solid substance before the compound is added to a bath but this will result merely in the formation of a small quantity of soap which will act to emulsify the oily substance. Even though all the oily substance became saponified, the so-formed soap would envelope the hydrosulphite and prevent the deterioration of the active ingredient. Soap is water resistant to a small amount of water, although soluble in an excess of water.

It may be found desirable to utilize a sulphoxylate formaldehyde instead of plain sodium hydrosulphite in which case it will be found necessary to provide an acid reacting bath. This may, and probably will be, effected by providing a solid mixture of the sulphoxylate formaldehyde, an oily substance that will encase the particles of the sulphoxylate formaldehyde, and a solid salt that may or may not react with the oily substance as desired. This compound together with an emulsifying or saponifying agent, either in the solid mixture or in the solution will accomplish the purpose of providing an effective stripper that may be sold in packages or otherwise without deterioration.

We may prefer to also add to the solid compound other substances such as solvents, assistants, penetrators, and fillers, as long as any such added substance does not interfere with the function of the oily substance.

We have not attempted herein to specify or mention all possible substances that may be used or that will function to protect the hydrosulphite from deterioration, depending on the disclosures as made to describe the principle of this invention.

We claim:

1. A composition of matter consisting of a mixture of a stripping chemical of the hydrosulfite class, a substance substantially insoluble in water and belonging to the class of oils, fats and waxes that will encase the individual particles of the stripping chemical and tend to exclude air and moisture therefrom, and an agent that will be substantially inert relative to said substance when the materials are in anhydrous mixture, and that will in a water solution release the substance from its association with said stripping chemical and form an emulsion with the water.

2. A composition of matter consisting of a mixture of a stripping chemical of the hydrosulfite class, a substance substantially insoluble in water and belonging to the class of oils, fats and waxes that will encase the individual particles of the stripping chemical, and tend to exclude air and moisture therefrom, and an agent that will in a water solution emulsify said substance with the water and release the said substance from its association with said stripping chemical and permit said substance to enter into water solution.

3. A composition of matter consisting of a chemical of the hydrosulfite class capable of evolving hydrogen, a substance substantially insoluble in water and belonging to the class of oils, fats and waxes enveloping the particles of said chemical, an agent that will in a water solution cause said oily substance to form an emulsion with the water, and an acid-reacting substance that will in water solution assist said chemical in evolving hydrogen.

4. A composition of matter consisting of a solid mixture of a chemical belonging to the hydrosulphite class, a petroleum hydrocarbon and an emulsifying agent capable of acting on said hydrocarbon in a water bath to cause the hydrocarbon to be released from the hydrosulphite and cause it to form an emulsion with the water.

5. A composition of matter that is stable under ordinary climatic conditions, consisting of a mixture of a stripping chemical of the hydrosulfite class when it enters into solution and a substance substantially insoluble in water and belonging to the class of oils, fats and waxes that will encase the individual particles of the stripping chemical and tend to exclude air and moisture therefrom, and an agent that will in a water solution disperse the oily character of the substance and free the stripping chemical.

6. A composition of matter consisting of a hydrosulphite, petrolatum in intimate mechanical mixture therewith in a sufficient quantity to form a film about substantially all the particles of the hydrosulphite, and isopropyl naphthalene sodium sulphonate in quantity sufficient to cause the petrolatum to form an emulsion in a water solution and thereby release the hydrosulphite from the film.

In testimony whereof we have affixed our signatures.

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