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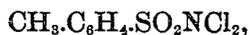
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COMPOUND AND PROCESS FOR TREATING VEGETABLE AND ANIMAL FIBERS AND FABRICS

No Drawing. Application filed September 14, 1931, Serial No. 562,821, and in Germany April 19, 1930.

This invention relates to the application of arylsulfondichloramides in the textile industry and it particularly relates to the bleaching of different materials as for instance fabrics, washing, fibers, yarns, green vegetable fibers or the like.

The arylsulfonchloramides, the chief representative of which is paratoluenesulfondichloramide of the formula

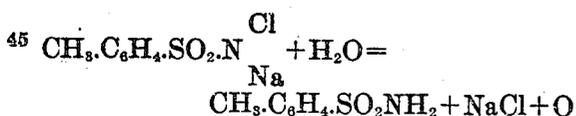


have up to now not been used for textile purposes, whereas the sodium salt of paratoluenesulfonchloramide, the so-called Aktivin is well known in the art as an excellent bleaching agent. The reason why the dichloramides have not been favored may be that they are insoluble in water. Furthermore, one was also afraid of the two molecules of chlorine which would act too strongly on the fiber upon contact of the latter with the solid particles of the dichloramide.

I have now found that particularly this p-toluene sulfondichloramide and other dichloramides are excellent materials for industrial bleaching purposes. They may be applied in an alkaline solution or suspension or even in the presence of neutral or acid solutions. As an alkali one may use a metal hydroxide or a metal salt of alkaline reaction as for example an alkali carbonate, silicate, borate, phosphate etc. When I use toluenesulfondichloramide and a caustic soda solution a reaction takes place according to the following equation:



The bleaching effect, measured by the quantity of the available oxygen, is thus twice as great as that of the monochloramide, which with water reacts according to the equation:



This means that with relatively considerably smaller quantities of the dichloramide

the same effect may be accomplished as with the monochloramide which fact represents great economical progress. The "dichloramide" readily dissolves in hot water in the presence of alkali metal hydroxide or metal salts of alkaline reaction whereby the danger of a local overbleaching effect by undissolved particles is avoided. And even the presence of not dissolved particles of dichloramide does not matter as in some of the following examples is described.

Advantageously the p-toluenesulfondichloramide is mixed with sodium carbonate or other salts of alkaline reaction whereby the obnoxious odor of chlorine is practically entirely eliminated. The mixture may be pressed into tablets.

For the better understanding of my invention I am going to describe, by way of examples, how I may proceed to carry the same into effect.

Example I—Manufacture of the bleaching agent

One mixes one part of p-toluenesulfondichloramide with one part or more parts of calcined sodium carbonate. Instead of sodium carbonate one may use an alkali metal silicate, borate, phosphate or the like. The mixture may be pressed to tablets.

Example II—Application of p-toluenesulfondichloramide in the industrial laundry

One applies to 1 kilo of dry washing 2 grams or more of a mixture according to Example 1. The quantity of the addition being dependent on the degree of the washing being soiled, and treats the washing therewith at an elevated temperature, which may include boiling it. Moreover, one may add to the mixture any of the known water softening means, such as an alkali-metal silicate, borate, phosphate, f. i. trisodium-phosphate, etc.

Example III—Bleaching of artificial silk

(a) One dissolves 1-2 parts of p-toluenesulfondichloramide with 3-6 parts of calcined sodium carbonate in 1000 parts of hot water and soaks the artificial silk in the solu-

tion for 1-2 hours, whereby the artificial silk is well bleached.

(b) One dissolves 1-2 kg of the product obtained according Example I in 10-20 kg of a 5% caustic soda solution at an elevated temperature. The mixture is diluted with 1000 litres of water, heated to about 70° C. and neutralized by an addition of hydrochloric or acetic acid. Artificial silk is treated with this solution. The progress of the bleaching reaction is much more rapid than according to Example III a.

(c) One part of a mixture of equal quantities of dichloramide and soda ash is given into 1000 parts of water and the temperature elevated to about 70-80° C. The dichloramide not being entirely dissolved by this way forms a suspension. The artificial silk is bleached by this batch, the suspension of dichloramide being dissolved in the measure as it is consumed.

Example IV—Bowking of cotton under pressure

In the bleaching of cotton the boiling of the goods with alkali-metal hydroxide under pressure plays a great part. By adding p-toluenesulfondichloramide to the "bowking-lye" the initial stages of the cleaning are accomplished with greater ease inasmuch as the albuminous matter and the resins contained in the cotton are more completely removed. The effect of the dichloramide is shown by the lighter color of the bowked goods and by the readiness with which the goods may be bleached, as well as in the more permanent white color ultimately displayed by the bleached goods.

One adds to the bowking lye for each 1000 kilos of dry goods from 1-2 kilos p-toluenesulfondichloramide either separately or in mixture with 1-2 kilos sodium carbonate or trisodiumphosphate, and bows at a pressure of 1-2 atmospheres for 4-6 hours.

Example V—Boiling off raw cotton and linen goods, mixed fabrics of cotton and artificial silk

One dissolves one part of p-toluenesulfondichloramide with three parts of sodium carbonate, which may be entirely or partly mixed before, in 1000 parts of hot water and soaks then the raw goods in this hot solution, whereby the gum, or the starch, contained in the applied goods, is dissolved.

Example VI—De-coloring of dyed goods

The alkaline solution of the p-toluenesulfondichloramide applied for this purpose may be made as described in the preceding example, except that its concentration may vary within wide limits according to the stability of the dyestuffs to be destroyed. If necessary, the effect of the alkaline dichloramine solution may be strengthened by add-

ing acid until it gives a neutral or an acid reaction. The dichloramide solution may also be used at a greatly varying range of temperature.

Example VII—Developing of dyes by oxidation

Fabrics, which were dyed with the difficultly oxidizable vat dyestuff Indanthrene Black (which is identical with the dyestuffs sold on the American market as Ponsol Black B and Anthrene Black B, BB, both of which have the same Color Index No. 1102), obtain a deep black by being passed through the solution of one part of p-toluenesulfondichloramide in 1000 parts of a 0.3 gr sodium carbonate solution.

Furthermore, vat dyestuffs, requiring an energetic oxidation after having been steamed, may be treated with this solution to obtain the most desirable color shade.

Indigo-sols are readily oxidized by the neutralized or acidulated solution.

It is obvious from the foregoing examples that only small quantities of the mixture are applied. Even these small quantities have to be carefully applied as upon the addition of the mixture the entire bleaching effect of the agent is rendered available at once and thus may affect the washing.

I prefer therefore, on the ground of close observation, to add the bleaching agent in compressed form instead of a loose powder. By means of such compressed forms, or tablets, the quantity of the bleaching agent may be very accurately measured.

It is essential for my invention to perform the dissolving spacedly separately from the washing operation, i. e. the dichloramide should not be thrown directly upon the washing. In the well known washing apparatus the washing is arranged in a perforated drum rotarily arranged in a water bath. It is in this water bath in which I dissolve the slowly dissolving compressed forms, which dissolve only very gradually in the washing liquid. Therefore, the washing is always acted upon by a very dilute bleaching solution as on account of the slow dissolving the priorly dissolved parts of the bleaching agent have already acted upon the washing and have thus already been used up when further quantities of the bleaching agent are about to dissolve.

Example VIII—Chlorinating wool

It depends entirely upon the desired effect how much of the p-toluenesulfondichloramide must be dissolved for the purpose in view; up to now I have ascertained that from 1/2-3 parts of p-toluenesulfondichloramide in 1000 parts of water answer practically all requirements; at first the solution is prepared by alkaline means, then 15 parts of concentrated hydrochloric acid are added in

order to precipitate the dichloramide yielding a milky liquid in which the wool is then soaked until active chlorine is consumed.

5 *Example IX—Bleaching of green plants*

p-toluenesulfondichloramide which is not or only slightly soluble in water can be dissolved by an addition of alkali. From this solution it can be precipitated in a finely divided form by the addition of an acid. In this solution or suspension the material to be bleached is treated at an elevated temperature. The solution may be kept in a circulating movement. Toluensulfondichloramide dissolves in the aqueous solution in the measure in which it is consumed for the bleaching process. As soon as the solution shows an alkaline reaction small portions of an acid may be added, in order to keep the solution neutral or slightly acid, the bleaching process being promoted by the presence of acid.

For instance one to two kilos of toluensulfondichloramide are dissolved in ten to twenty liters of a 5% solution of sodiumhydroxide at a slightly elevated temperature. About 100 liters of water are added and the solution is neutralized with hydrochloric acid. The toluensulfondichloramide separates in form of a white milk. Now 8 to 10 kilos of the material to be bleached are added to the solution, the material being favorably imbibed with water before. The solution is heated to about 50-70° and is favorably agitated by a stream of air. The bleaching process is continued for about 24 hours.

It is not necessary to start from toluensulfondichloramide. One may also use this bleaching agent in statu nascendi by acidulating a solution of the sodium salt of toluensulfonchloramide. In this way a mixture of toluensulfondichloramide and toluensulfonchloramide is formed. Toluensulfonamide may be transformed into toluensulfonchloramide or toluensulfondichloramide by the addition of a hypochlorite. It is obvious, that one can also start from toluensulfonamide and transform it into toluensulfondichloramide by treating it in an aqueous suspension with hypochlorite or with gaseous chlorine in the presence of a substance of alkaline reaction, as it is known in the art.

55 What I claim is:

1. The process for treating textile or fibrous material, said process comprising acting upon said material in an aqueous bath with p-toluenesulfondichloramide in the presence of an alkali-metal compound of alkaline reaction at a temperature above that of the atmosphere.

2. The process for treating textile or fibrous material, said process comprising acting upon said material in an aqueous bath with p-toluenesulfondichloramide in the presence of an alkali-metal compound of alkaline reaction

under pressure at a temperature above that of the atmosphere.

3. The process for treating textile or fibrous material, said process comprising acting upon said material in an aqueous bath with p-toluenesulfondichloramide in the presence of an alkali-metal compound of alkaline reaction, thereby decomposing the p-toluenesulfondichloramide, and subsequently acidulating the reaction mixture during its action on the fibers.

4. The process for treating textile or fibrous material, said process comprising acting upon said material in an aqueous bath with p-toluenesulfondichloramide in the presence of sodium carbonate.

5. The process for treating textile or fibrous material, said process comprising acting upon said material in an aqueous bath with p-toluenesulfondichloramide in the presence of sodium silicate.

6. The process for treating textile or fibrous material, said process comprising acting upon said material in an aqueous bath with p-toluenesulfondichloramide in the presence of trisodium phosphate.

7. As a new article of manufacture, a composition of matter consisting of p-toluenesulfondichloramide and of solid sodium silicate.

8. As a new article of manufacture a composition of matter consisting of p-toluenesulfondichloramide and trisodium phosphate.

In witness whereof, I have hereunto set my hand.

RICHARD FEIBELMANN.