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PROCESS OF TREATING FIBROUS MATERIALS AND THE MATERIALS THUS OBTAINED

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The present invention relates to a process of treating fibrous materials and to the materials thus obtained. It especially relates to an improvement of the felting properties of materials of animal origin.

It is known that the felting properties of hair of animal origin may be improved by treating it with compounds of polyvalent metals, if desired, with addition of wetting agents. The effect of the said compounds, however, is not satisfactory and cannot be compared with that of mercury salts.

Now, I have found that the felting properties of fibrous materials of animal origin may be greatly improved by treating them with compounds of polyvalent metals and with oxalkylation products of aliphatic hydroxy compounds of high molecular weight or of phenols substituted in the nucleus by hydrocarbon radicals of high molecular weight. The process may be carried out either in one or in two stages, for instance, by first treating the material with the oxalkylation product and then causing the compounds of polyvalent metals to act on the material thus treated. In most cases it is possible to use very dilute solutions; the desired effect is obtained already at ordinary temperature, by heating the action is accelerated. The fibrous material may be subjected to any additional treatment, for instance, to a treatment of further improving the felting properties, to a moth-proofing or bleaching process. An especially good effect is obtained by pre-treating the fibrous material of animal origin in the usual manner with oxidizing agents.

As oxalkylation products there may be named, for instance, reaction products from ethylene oxide and alcohols of high molecular weight such as dodecyl alcohol, cetyl alcohol, octodecyl alcohol, oleyl alcohol and naphthene alcohols; there may also be used industrial alcohol mixtures obtained by reduction of fats, fatty acids or fatty acid mixtures or by other technical processes. Instead of ethylene oxide there may also be applied other $\alpha.\beta$-alkylene oxides, for instance, propylene oxide or glycide. Instead of alcohols of high molecular weight there are also suitable other aliphatic hydroxy compounds, for instance, ethanol amides of aliphatic carboxylic or sulfonic acids of high molecular weight. Phenols substituted in the nucleus by hydrocarbon radicals of high molecular weight whose oxalkylation products obtained by means of $\alpha.\beta$-alkylene oxides may be used in the present process are, for instance, butyl phenols, hexyl phenols, octyl phenols, especially $\alpha.\alpha.\gamma.\gamma$-tetramethylbutylphenol, dodecylphenol, tetradecylphenols or commercial mixtures of phenols obtained by condensation of phenol or cresol with alcohols, olefines or alkyl halides. For instance, there may be used olefines from cracking gases or the polymerization products thereof or chlorination products of high-molecular aliphatic hydrocarbons. It is also possible to start with high-molecular alcohols obtained as by-products in the methanol synthesis from carbon monoxide, to prepare therefrom olefines by splitting off water and to condense these olefines either directly or after dimerization with phenol or cresol.

As polyvalent metals whose compounds are suitable for the present process there are named, for instance, tin, zirconium, thorium, uranium, thallium, aluminium, zinc, copper, titanium, iron, bismuth, cobalt, cerium, tungsten, molybdenum, manganese, nickel, cadmium. It is suitable to use the water-soluble salts of these metals, for instance, the chlorides, sulfates and nitrates.

The following examples illustrate the invention;

(1) Wool felt is placed for 2 hours at ordinary temperature into a dilute, acidified solution of hydrogen peroxide. The material is then dried at 80° C–100° C and soaked for 2 hours at 50° C–60° C in a solution containing 0.7% of the reaction product of 20–25 mols of ethylene oxide with sperm oil alcohol and 0.5% of tin salt. The material has a higher tendency to felt than unmordanted material.

(2) Loose felt from rabbit hair is handled for 15 minutes at 90° C in a solution containing 0.7% of the reaction product from 6 mols of ethylene oxide and 1 mole of iso-octylphenol and 0.7% of tin salt. The material felts better than a corresponding material from hair mordanted with mercury salts.

(3) Loose coney hair is soaked overnight in a solution containing 1.4% of the reaction product from 20 mols of ethylene oxide and 1 mol of sperm oil alcohol and 2% of pink salt. The material is then dried at 80° C–100° C and felted. The felt shrinks more than a felt from hair mordanted with mercury salt and felted with sulfuric acid of 0.1%. Instead of tin chloride there may also be used 2.75% of thallous sulfate.

(4) Felt from unmordanted rabbit hair is soaked overnight in a solution containing 1.5% of the reaction product from 15 mols of ethylene oxide and 1 mol of the ethanolamide of tallow fatty acids and 0.65% of tin salt. The felt

shrinks more than a felt from hair mordanted with mercury salt.

(5) Loose rabbit hair is turned for 15 minutes in a solution of 6% of aluminium chloride and 35% of the reaction product from 25–30 mols of ethylene oxide and oleyl alcohol. The material is then dried at 80° C–100° C and felted. The material has a very good tendency to felt.

(6) Loose hares hair is treated for 45 hours at ordinary temperature with a solution containing 0.35% of the reaction product from 20–25 mols of ethylene oxide and sperm oil alcohol and 4% of nitric acid (specific gravity 1.4). The material is then centrifuged and dried at 80° C. After drying, the hair is handled for 2 hours at 50° C-60° C in a solution containing 0.35% of the reaction product from 25–30 mols of ethylene oxide and oleyl alcohol and 0.6% of tin salt. On felting, the material shrinks much more than a material mordanted with mercury salt.

(7) Coney hair is soaked for 12 hours at room temperature in a solution containing per liter 20 grams of the reaction product from 12 mols of ethylene oxide on 1 mol of dodecylphenol and 20 grams of thallous sulfate. The material is then centrifuged and dried at 80° C. For felting a solution is used which contains per liter 10 grams of the above mentioned phenol derivative and 1 gram of sulfuric acid.

(8) Hares hair is soaked for 15 minutes at 80° C–90° C in a solution containing per liter 10 grams of the reaction product from 25–30 mols of ethylene oxide and 1 mol of oleyl alcohol and 25 grams of zirconium oxychloride

$$(Zr.OCl_2+8H_2O)$$

The material is centrifuged and dried at 80° C. By using the mordant solution also on felting the felting process is greatly enhanced.

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