

UNITED STATES PATENT OFFICE

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PROCESS OF PRODUCING DISILANE-RAYON

Rudolph S. Bley, Elizabethton, Tenn., assignor to North American Rayon Corporation, New York, N. Y., a corporation of Delaware

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8 Claims. (Cl. 106—40)

The present invention relates to a process of preparing cellulosic spinning solutions from which soft-lustre products, such as filaments, yarns, ribbons, films, etc., may be produced.

5 The primary object of my invention has to do with the incorporation of alkyl derivatives of disilane into cellulosic spinning solutions, such as viscose and cuprammonium cellulose, which will yield upon extrusion or molding soft-lustre products of pleasing hand.

10 Another object of my invention has to do with the incorporation of hexamethyldisilane into viscose and cuprammonium cellulose solutions.

15 A third object of my invention relates to the manufacture of novel, soft-lustre products per se containing alkyl derivatives of disilanes.

Other objects of my invention will become apparent to those skilled in the art after a study of the following specification.

20 In the early days of rayon manufacture, the demand was entirely for yarns having the highest degree of lustre. Later, when it was found that highly lustrous rayon too clearly indicated its origin—an artificial fibre—a demand arose for artificial silk which more closely approximated to natural silk. The earliest attempt to meet the demand of dull-lustre viscose, for example, was a method of retaining sulphur particles in the fibres by discontinuing the normal desulphurizing step during its manufacture. Although this yarn showed decreased lustre, due to scattering of light by the sulphur particles, it was impermanent and exhibited an unattractive "bloom". This method has been improved by dispersing, instead of sulphur, fine inorganic and organic particles and globules in cellulosic spinning solutions, for example, pigments, hydrocarbons, oils, etc. When inorganic compounds, such as titanium dioxide, silica, etc. are dispersed in cellulosic spinning solutions, they tend to cut the thread guides through which they are led during the extrusion process, and in addition they weaken them considerably. Hydrocarbons, emulsified with spinning solutions to deluster cellulosic products obtained therefrom, have the great disadvantage of being inflammable, while vegetable oils become rancid and form skin-irritating acids.

50 I have, unexpectedly, found that alkyl derivatives of disilane ($\text{H}_3\text{Si.SiH}_3$) possess properties which render them especially suitable as delustering agents for rayon products, since they are practically fire-resistant and do not form irri-

tating decomposition products. These alkyl derivatives have the following structures:

1. $\text{R.H}_2\text{Si.SiH}_2\text{R}$
2. $\text{R}_2\text{HSi.SiH}(\text{R}_x)_2$
3. $\text{R}_3\text{Si.Si}(\text{R}_x)_3$

in which R and R_x represent alkyl radicals. These radicals may be either identical or differ from each other. In other words, R and R_x may represent both a methyl group, or R may be a methyl group and R_x an ethyl group, etc. The following table depicts a number of compounds which may be used in accordance with my present invention.

Table

Derivatives having the structure: $\text{R.H}_2\text{Si.SiH}_2\text{R}_x$:

- $\text{CH}_3\text{.H}_2\text{Si.SiH}_2\text{CH}_3$
- $\text{CH}_3\text{.H}_2\text{Si.SiH}_2\text{C}_2\text{H}_5$
- $\text{C}_2\text{H}_5\text{.H}_2\text{Si.SiH}_2\text{C}_2\text{H}_5$
- $\text{C}_2\text{H}_5\text{.H}_2\text{Si.SiH}_2\text{C}_3\text{H}_7$
- $\text{C}_3\text{H}_7\text{.H}_2\text{Si.SiH}_2\text{C}_3\text{H}_7$
- etc.

Derivatives having the structure:

$\text{R}_2\text{HSi.SiH}(\text{R}_x)_2$

- $2(\text{CH}_3)\text{.HSi.SiH}(\text{CH}_3)_2$
- $2(\text{CH}_3)\text{.HSi.SiH}(\text{C}_2\text{H}_5)_2$
- $2(\text{C}_2\text{H}_5)\text{.HSi.SiH}(\text{C}_2\text{H}_5)_2$
- $2(\text{C}_2\text{H}_5)\text{.HSi.SiH}(\text{C}_3\text{H}_7)_2$
- $2(\text{C}_2\text{H}_5)\text{.HSi.SiH}(\text{C}_4\text{H}_9)_2$
- $2(\text{C}_3\text{H}_7)\text{.HSi.SiH}(\text{C}_3\text{H}_7)_2$
- etc.

Derivatives having the structure:

$\text{R}_3\text{HSi.SiH}(\text{R}_x)_3$

- $3(\text{CH}_3)\text{.Si.Si}(\text{CH}_3)_3$
- $3(\text{CH}_3)\text{.Si.Si}(\text{C}_2\text{H}_5)_3$
- $3(\text{C}_2\text{H}_5)\text{.Si.Si}(\text{C}_2\text{H}_5)_3$
- $3(\text{C}_3\text{H}_7)\text{.Si.Si}(\text{C}_3\text{H}_7)_3$
- $3(\text{C}_3\text{H}_7)\text{.Si.Si}(\text{C}_2\text{H}_5)_3$
- etc.

Example

About 1 to 20% of an alkyl derivative of disilane, for example hexamethyl-disilane

$(3(\text{CH}_3)\text{Si.Si}(\text{CH}_3)_3)$

is dispersed in and/or emulsified with a cellulosic spinning solution, such as viscose and cuprammonium cellulose, the aforementioned percentage being based upon the cellulose content of the solution. After uniformly distributing the delustering agent in the spinning solution, it is ex-

truded through suitable spinning nozzles into a conventional spinning bath. Organic solvents, inorganic or organic pigments, etc., may be added to the spinning solutions in addition to the silicon compounds. The amounts of these aliphatic silicon derivatives, to be added to the cellulosic solutions, may be varied at will. In this manner, more or less delustered rayon products may be obtained.

Modifications of my process will readily be recognized by those skilled in the art, and I desire to include all those modifications falling within the scope of the appended claims. In these claims, the term "alkyl derivatives of disilane" is limited to such compounds which are substantially water-insoluble and which are not deleteriously affected by acids and alkalis of such concentrations conventionally used in the rayon art.

I claim:

1. A spinning solution for the manufacture of soft-lustre products comprising a solution of the group consisting of viscose and cuprammonium cellulose together with an alkyl derivative of disilane having the structure $R.H_2Si.SiH_2R_x$, in which R and R_x represent an alkyl radical, said derivative being liquid and stable in said spinning solution.

2. As a new article of manufacture, regenerated cellulose containing a small amount of an alkyl derivative of disilane having the structure



in which R and R_x represent an alkyl radical, said disilane being liquid and finely dispersed throughout said cellulose.

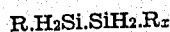
3. A spinning solution for the manufacture of soft-lustre products comprising a solution of the group consisting of viscose and cuprammonium cellulose together with a substance of the group consisting of alkyl derivatives of disilane having the structure $R.H_2Si.SiH_2R_x$ in which R and R_x represent an alkyl radical, alkyl derivatives of disilane having the structure $R_2.HSi.SiH.(R_x)_2$ in which R and R_x represent an alkyl radical and alkyl derivatives of disilane having the structure $R_3.Si.Si.(R_x)_3$ in which R and R_x represent

an alkyl radical, said substance being liquid and stable in said solution.

4. A spinning solution for the manufacture of soft-lustre products comprising a solution of the group consisting of viscose and cuprammonium cellulose together with an alkyl derivative of disilane having the structure $R_2.HSi.SiH.(R_x)_2$ in which R and R_x represent an alkyl radical, said derivative being liquid and stable in said solution.

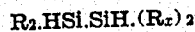
5. A spinning solution for the manufacture of soft-lustre products comprising a solution of the group consisting of viscose and cuprammonium cellulose together with an alkyl derivative of disilane having the structure $R_3.Si.Si.(R_x)_3$ in which R and R_x represent an alkyl radical, said alkyl derivative being liquid and stable in said spinning solution.

6. As a new article of manufacture, regenerated cellulose containing a small amount of a substance of the group consisting of alkyl derivatives of disilane having the structure $R_2.HSi.SiH.(R_x)_2$ in which R and R_x represent an alkyl radical, alkyl derivatives of disilane having the structure



in which R and R_x represent an alkyl radical and alkyl derivatives of disilane having the structure $R_3.Si.Si.(R_x)_3$ in which R and R_x represent an alkyl radical, said substance being liquid and finely dispersed throughout said cellulose.

7. As a new article of manufacture, regenerated cellulose containing a small amount of an alkyl derivative of disilane having the structure



in which R and R_x represent an alkyl radical, said derivative being liquid and finely dispersed throughout said cellulose.

8. As a new article of manufacture, regenerated cellulose containing a small amount of an alkyl derivative of disilane having the structure



in which R and R_x represent an alkyl radical, said substance being liquid and finely dispersed throughout said cellulose.

RUDOLPH S. BLEY.