

1

3,642,936

COATING COMPOSITION OF AN ISOCYANATE TERMINATED POLYURETHANE, A VINYL CHLORIDE POLYMER AND POLYSILOXANE

George R. Hodge, Old Hickory, Tenn., and Angelos V. Patsis, New Paltz, N.Y., assignors to E. I. du Pont de Nemours and Company, Wilmington, Del.

No Drawing. Original application Oct. 22, 1968, Ser. No. 769,708, now Patent No. 3,551,830, dated Dec. 29, 1970. Divided and this application June 3, 1970, Ser. No. 43,217

Int. Cl. C08g 41/04

U.S. Cl. 260—827

11 Claims

ABSTRACT OF THE DISCLOSURE

A coating composition that consists essentially of an isocyanate terminated polyurethane, a vinyl chloride polymer and a reactive polysiloxane is the subject of this invention. This coating composition is particularly useful for forming glossy vapor permeable finishes on natural leather and synthetic microporous coriaceous sheet materials that are free from surface tack.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a divisional application of my co-pending application Ser. No. 769,708 filed Oct. 22, 1968, now U.S. Patent No. 3,551,830, granted Dec. 29, 1970.

BACKGROUND OF THE INVENTION

This invention is concerned with a coating composition for vapor permeable sheet materials useful for making shoe uppers, and in particular, sheet materials of this type which are highly glossy. These glossy materials are also used to make ladies' handbags, purses, belts and other articles requiring strength, flexibility and durability.

A variety of coating compositions providing a high gloss finish have been commercially available for several years. Most of these compositions are both non-porous and impervious to vapors and the remainder have vapor permeability values substantially less than the minimum required for comfortable shoe uppers. Also, flexibility and scuff resistance of most of these compositions is so low that they soon crack or lose their glossy appearance, or both.

In addition, these compositions when dried possess a surface tack which causes, for example, shoe uppers to adhere to one another when the glossy surfaces are placed in contact with each other as occurs when one walks or sits. This surface tack is not only disconcerting to the wearer of the shoes and increases the scuffing of the shoe, but is also dangerous. There is at least one instance recorded where a woman's shoes have stuck together causing the wearer to fall and injure herself.

This invention provides a coating composition that provides a durable highly glossy non-porous vapor permeable finish on microporous sheet material free from these deficiencies of the prior art materials, in particular free from surface tack and is eminently suitable for shoe uppers, ladies' handbags, belts and other high style accessories.

STATEMENT OF THE INVENTION

The coating composition of this invention has a 5 to 25% by weight polymer solids content in an inert organic solvent of a polymer blend that consists essentially of

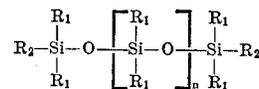
(1) About 70 to 99.9% by weight based on the total weight of the polymer of the coating of an isocyanate terminated polyurethane which is the reaction product of an organic diisocyanate and an active hydrogen containing

2

polymer which is either a poly(alkyleneether) glycol or a hydroxy terminated polyester;

(2) Up to 25% by weight based on the weight of the polymer of the coating of a vinyl chloride polymer; and

(3) 0.1-1% by weight based on the weight of the polymer of said coating of a reactive polysiloxane of the formula



wherein R₁ is either —H or an alkyl group having 1-4 carbon atoms, R₂ is either —NCO, —NH₂, —H or —OH and n is an integer sufficiently large to give said polysiloxane an inherent viscosity of 0.1-2.0 at 25° C.

DESCRIPTION OF THE INVENTION

The term "non-porous" as used in describing this invention refers to a sheet material or a coating of a synthetic polymeric material free from visible pores (as viewed by the naked eye or with a microscope of up to 300×power), which polymeric material in the form of an unsupported film one mil thick does not contain a significant number of light scattering gas/polymer interfaces.

The term "porous" refers to coatings and sheet materials which do not meet the test of non-porosity as set forth above. "Microporous" refers to porous materials, the pores of which are not discernible to the naked eye.

The term "glossy," as used to describe this invention, refers to a surface having a reflectance of at least 50% at 60° in accordance with ASTM Test No. D-523-62T. All of the products of this invention have at least this minimum degree of reflectance and some have a reflectance of over 94% on this basis. Preferably, the products of this invention have a 60° gloss of 80 to 98.

Water vapor permeability value of the novel sheet material for this invention is at least 600, preferably 1200 to about 2100, and preferably, higher. Water vapor permeability of the novel sheet material is determined by sealing the sheet on top of a cup containing CaCl₂. This sealed cup is stored at 90% relative humidity and the weight increase due to moisture permeating through the material is determined and the water vapor permeability is calculated in

grams of water

100 square meters of material/hour

It is important that the vapor permeable non-porous synthetic polymeric coating applied to the microporous fibrous substrate have a thickness of about 0.1 to about 1.5 mil, and preferably, about 0.2-0.4 mil. This coating can be applied as a single layer or several layers so long as the total thickness does not exceed about 1.5 mil. When the coating comprises more than one layer, these may be the same or different polymeric materials. In accordance with a particularly preferred embodiment of this invention, the coating consists of two layers, each of a different polymeric material and with the embossing step taking place between application of the coatings.

Coatings of polymeric materials can be applied to the microporous fibrous substrate by any convenient procedure such as dip coating, spray coating, roller coating, doctor blade coating, lamination or the like so long as the coating has a uniform thickness. These coatings may be clear, but are preferably, pigmented and it is a particularly surprising attribute of this invention that products having coatings containing as much as 70% pigments by weight exhibit a highly glossy appearance.

The glossy vapor permeable coating of this invention consists essentially of 70 to 99.9% by weight based on the total weight of the polymer of the coating, and pref-