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MONSANTO CHEMICALS

AROCLOR 1254 LUBRICANT AND PLASTICIZER IN THE MANUFACTURE OF PAPER DRAPERIES

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Aroclor* 1254, chlorinated biphenyl, is an efficient, economical and nonflammable lubricant for the inorganic fire-retardant agents used in making paper draperies that do not support combustion.

Also, Aroclor 1254 is an attractive co-plasticizer for the vinyl coating applied to the paper drapery material to give it a smooth and chintz-like appearance.

These specific uses for Aroclor 1254 in manufacturing paper draperies suggest other similar applications for Aroclors in the paper products industry.

*Registered in U. S. Patent Office.

The information in this bulletin is based on our experience, represents our best judgment in the matter, and is intended to be helpful; but we cannot assume responsibility for any loss or accident that may result from its use.

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I. INTRODUCTION

The popularity of paper draperies in this country has increased because of their economy as well as their highly decorative and aesthetic value. Untreated paper lacks certain physical qualities paramount in the use of this material for draperies. To impart required fire-resistance, the paper is usually treated with inorganic fire-retardant salts such as ammonium sulfamate or ammonium phosphates. However, treatment of this type produces a brittle sheet especially at relatively low humidity conditions as would be encountered in the winter time when the draperies are hung adjacent to radiators. This is prevented by the incorporation of Aroclor 1254 alone or in combination with a small amount of polyisobutylene, which serves as a lubricant to give the desired flexibility, softness or hand, and drape.

Aroclor 1254 is particularly attractive as a permanent and stable lubricant for this purpose because of its fire-retardant qualities, its low vaporization rate, freedom from odor, its outstanding resistance to moisture or water, and its relatively low cost.

In contradistinction to the use of a highly water-resistant lubricant, such as Aroclor 1254, in the past the practice was to use paper lubricants or softening agents such as glycerine and various glycols which, to a large degree, functioned as humectants. This method of lubrication is objectionable when high humidities prevail, as it is known that such humectant-type lubricants can pick up sufficient moisture so that the drapery materials drip.

In addition to its value as a lubricant and fire-retardant, Aroclor 1254 appears to have a stabilizing influence on the paper fibers. When lubricants other than Aroclors, especially the humectant type, are used, the fibers seem to lose their abrasion resistance against rubbing with a wet cloth--a factor of importance when cleaning paper draperies.

Another consideration of importance in preparing paper stock for drapery use is the incorporation of wet-strength qualities essential during processing the paper with the fire-retardant agents and also of merit in the end use of the paper draperies. This is accomplished by customary methods for treating the pulp in the beater with melamine resins and then curing.

Since much of the drapery material is used in warm, humid climates, it is also good practice to treat the paper with a preservative such as Monsanto's Santobrite (sodium pentachlorophenate) to protect it against organism attack, particularly

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fungi, but also termites. As little as 0.2% of Santobrite based on the weight of the paper is sufficient to give the desired protection.

In general, there are two types of paper drapery materials made. The simplest is the colored and printed paper treated with lubricated fire-retardant salts. This may be referred to as the plain type drapery material.

The second type is a similar product but coated with a vinyl resin, such as Geon 100X-210, or a mixture of this resin with Geon 100X-26S, plasticized with a mixture of fire-retardant plasticizers. These mixtures may consist of Aroclor 1254 in combination with triphenylphosphate and Santicizer 140, and the vinyl application is of the type commonly called a plastisol or paste. This technique for applying the vinyl coating eliminates the use of flammable solvents which cannot be tolerated in paper processing plants because of the fire hazard. The thin film of vinyl coating gives the draperies a pleasing, smooth and lustrous chintz-like appearance.

II. MANUFACTURE OF THE PLAIN TYPE DRAPERIES

The wet-strength paper is treated with an emulsion of the inorganic fire-retardant salts and the Aroclor lubricant.

Using a padder box, the emulsion is padded on the paper and then passed through squeeze rolls for impregnation and removal of excess quantities of the emulsion. Then the rapidly moving paper strikes a baffle which crepes it. After this, the paper passes over a series of heated dry cans, or a series of seamless infrared gas burners which give proper drying.

Sometimes as much as 2.5% of Aroclor 1254, based on the weight of the treated paper, is used along with a small amount of polyisobutylene to impart the desired lubricating effect.

A satisfactory and stable emulsion as used consists of about 2-4% of Aroclor 1254, 25% of ammonium sulfamate and 0.5% of emulsifying agents, with the remainder water. One of the suggested emulsifying agent combinations is that of Span and Nopco. Another consists of 0.25% of Sterox SE and 0.25% of Tween 80, based on the total weight of the emulsion.

It has been our experience that ammonium sulfamate fire-retardant salts are easier to emulsify than diammonium phosphate in formulations of this type. To accomplish a better diammonium phosphate emulsion, it is usually necessary to use a mixture of 75 parts of

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Aroclor 1254 and 25 parts of mineral oil, such as Nujol, and Santomerse S as the emulsifying agent. The suggested emulsion contains 25% of diammonium phosphate, 2-4% of the Aroclor-Nujol mixture, 0.5% of Santomerse S, and the remainder water.

The paper treated with the fire-retardant emulsion, and then dried, is finally printed or colored to give the ready-to-use drapery material.

III. MANUFACTURE OF VINYL PLASTIC COATED PAPER DRAPERIES

The plastic coating, which is usually vinyl resin, such as Geon 100X-210, or a combination of 75 parts of this resin with 25 parts of Geon 100X-26S, is applied to the finished treated paper stock, as described above.

Using fire-resistant plasticizers, such as a combination of Aroclor 1254, Santicizer 140 and triphenylphosphate, a plastisol or paste is prepared in the absence of flammable solvents. This vinyl paste is padded on to the paper which is then dried at about 300°F., followed by very rapid fusion at 360°F.

Usually the vinyl plastic coating on the paper is very thin since the economics involved in the manufacture of paper draperies do not permit the use of thicker coatings which would be more expensive.

IV. DERMATOLOGY AND TOXICOLOGY OF AROCLOR 1254

The dermatology and toxicology of Aroclor 1254 are considerations in the use of this material both as a lubricant for the inorganic fire-retardant salts and also as a co-plasticizer for the vinyl coating applied to the draperies.

Skin patch tests, made in accordance with standard procedures and supervised by competent medical personnel, show that Aroclor 1254 alone, when applied to the skin, or when vinyl plastics plasticized with Aroclor 1254 are applied to the skin, is neither a skin irritant nor a skin sensitizer.

The only point of concern in the use of Aroclor 1254 in the manufacture of paper draperies deals with vapors that may be emitted during the drying operations. Although Aroclor 1254 has a low vapor pressure and a relatively low evaporation rate, it must be borne in mind that the material on the paper is there in an exceedingly thin film. This is conducive to vaporization. It has been observed that when running only several thousand feet

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of the paper, there is practically no build-up of vapors around the processing machinery. However, on large-scale continuous production, vapors of the Aroclor and other ingredients will build up if the processing machinery is not properly vented. Aroclor vapors bear a degree of toxicity as reflected by results indicating that 0.5 mg. of Aroclor 1254 vapor per cubic meter of air is the maximum amount allowable for safe working conditions. Accordingly, the machine used for treating the paper should be enclosed, if this is possible, and always properly vented with forced draft or suction fans.

The use of drying rooms or chambers where the paper is festooned in a relatively unvented and heated atmosphere to effect the drying is not to be recommended where either Aroclor 1254 or other chemicals, whose vapors bear a degree of toxicity, are used in the process. The hot air in chambers of this type is normally not vented and would present a hazard in the event of a breakdown when the workmen would have to enter the drying chamber. Although gas masks would be worn by the workmen, this practice is somewhat discomforting and not readily acceptable.

When Aroclor 1254 is used and the paper is dried by passage over dry cans or a combination of dry cans and infrared burners, it is practicable to enclose this machinery and to vent it properly by using exhaust fans. Under these conditions, the operation appears free from any toxicity hazard.

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