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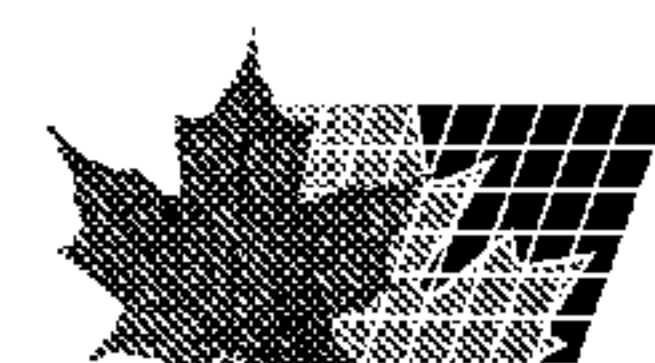
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(54) Titre : COMPOSITION THERMOPLASTIQUE, CONCUE POUR REDUIRE LA PENETRATION PAR LES FLUIDES

(54) Title: PERMEATION REDUCING THERMOPLASTIC COMPOSITION

(57) **Abrégé/Abstract:**

The present invention is directed to a thermoplastic additive containing aluminium stearate and polyvinylidene fluoride which when added to thermoplastics such as polyethylene inhibits and reduces permeation of fluids stored within containers composed of the thermoplastic. The invention has been proven effective in reducing the permeation of hydrocarbon based materials.



ABSTRACT

The present invention is directed to a thermoplastic additive containing aluminium stearate and polyvinylidene fluoride which when added to thermoplastics such as polyethylene inhibits and reduces permeation of fluids stored within containers composed of the thermoplastic. The invention has been proven effective in reducing the permeation of hydrocarbon based materials.

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PERMEATION REDUCING THERMOPLASTIC COMPOSITION

BACKGROUND OF THE INVENTION

Polyethylene is a favored material used in constructing containers. It is cheaply produced as molded or extruded. However, polyethylene has serious drawbacks.

5 When certain fluids such as hydrocarbon based materials are packaged in polyethylene containers, they have a tendency to seep through the container wall. This is due to the permeable nature of polyethylene.

SUMMARY OF THE INVENTION

10 It is an object of the invention to provide a thermoplastic additive which when blended with a thermoplastic serves as a barrier to the permeation of fluids, and in particular, hydrocarbon based materials.

It is a further object of the invention to provide a drum, bottle, container or the like capable of resisting permeation of fluids, and particularly, hydrocarbon based materials.

15 It is a further object of the invention to provide a thermoplastic additive which can be formed into a liner for containers of other materials, such as metal and paper products, which provides resistance to fluid permeation.

The present invention is a thermoplastic additive which is added to thermoplastics, particularly, polyethylene. The additive is comprised of a carrier

thermoplastic, polyvinylidene fluoride and aluminium stearate as a tie agent, binding the polyvinylidene fluoride and the carrier thermoplastic. It is preferable that the carrier thermoplastic be high molecular weight high density polyethylene.

5 It is possible, in accordance with the invention, to form a drum for the containing and transporting of fluids. The drum is comprised of a carrier thermoplastic material, preferably high molecular weight high density polyethylene, and an additive comprising a mixture of the carrier thermoplastic material, polyvinylidene fluoride and aluminum stearate.

10 It is also possible to form the blend into a liner suitable for lining metal drums and containers of other materials, thereby serving as extra measure of protection against permeation.

Aluminium stearate is used as an agent capable of gelling or thickening aliphatic and aromatic hydrocarbons. In the present invention, its presence as an additive to thermoplastics or to thermoplastic liners reduces permeation through the container walls. If 15 aliphatic or aromatic hydrocarbons penetrate the interior container wall or interior liner, the presence of aluminium stearate would cause a localized thickening, thereby preventing permeation.

EXAMPLE

The additive is prepared by mixing polyvinylidene fluoride (PVDF) and 20 aluminium stearate with the carrier thermoplastic. The PVDF can be in either powderized or pelletized form. In this example, the thermoplastic is high molecular weight high density

polyethylene (HMW-HDPE). The components of the blend were mixed in the following ratio:

	HMW-HDPE	52 lbs.
	PVDF	48 lbs.
5	Aluminium stearate	56 grms/cwt

Prior to mixing, the blend is covered. After mixing of the additive, it is suitable for a subsequent blending with a resin of the carrier. The subsequent blending creates a thermoplastic composite that resists and reduces permeation through its walls. It is preferred that after the subsequent mixing with the carrier thermoplastic, the additive comprise 3 to 10 6% of the total composition of the subsequent composite.

The blend may also be used as a thermoplastic liner for containers of other materials. The liner is applied to the containers by means known by those skilled in the art.

TEST DATA

Three drums were tested to determine the amount of permeation through the 15 drum walls.

The drums were filled with xylene and then stored for a period of a year. Data reflecting the percentage of fluid permeating through the drum was compiled on a intermittent basis.

Drum #1 was a control drum possessing no permeation resistant additives.
20 Drum #2 possessed a 3% permeation resistant additive as disclosed in the invention. Drum

#3 possessed a 6% permeation resistant additive as disclosed in the invention.

		<u>30 day/50° C</u>	<u>12 weeks/50° C</u>	<u>1 year at ambient</u>
	Drum #1	0.7% loss	2.08% loss	6.0% loss
3%	Drum #2	0.4% loss	1.1% loss	4.7% loss
5	6% Drum #3	0.19% loss	0.58% loss	4.6% loss

As can be seen, the drums containing the additive exhibit a resistance to permeation. The additive brings the drums into compliance with Department of Transportation regulations, which set a maximum of 0.5% loss at 50° C for a thirty day period for hazardous materials, and 2% loss at 50° C for a thirty day period for non-hazardous materials.

CLAIMS:

20 3 7 5 7 2

1. A thermoplastic composition suitable for manufacture of drums having an improved resistance to permeation of fluids, said composition comprising high molecular weight, high density polyethylene and an amount of a thermoplastic additive comprising a mixture of said high molecular weight, high density polyethylene, polyvinylidene fluoride and aluminium stearate effective to decrease the permeability of said composition to fluids.
2. The thermoplastic composition of claim 1, wherein said amount of said additive comprises from 3% to 6% by weight of said thermoplastic composition.
3. The thermoplastic composition of claim 1, wherein said additive comprises 52 parts by weight of high molecular weight, high density polyethylene, 48 parts by weight of polyvinylidene fluoride and 56 grams of aluminium stearate per hundred pounds (45.4 kilograms) of said additive.
4. A drum for containing and transporting fluids and capable of resisting the permeation of fluids having a wall comprised of the thermoplastic composition of claim 1.
5. A drum for containing and transporting fluids and capable of resisting the permeation of fluids having a wall comprised of the thermoplastic composition of claim 2.
6. A drum for containing and transporting fluids and capable of resisting the permeation of fluids having a wall comprised of the thermoplastic composition of claim 3.

7. A method of reducing the permeability of high molecular weight, high density polyethylene to fluids, said method comprising incorporating into said high molecular weight, high density polyethylene an amount of a thermoplastic additive comprising a mixture of said high molecular weight, high density polyethylene, polyvinylidene fluoride and aluminium stearate effective to reduce the permeability of said composition to fluids.
8. The method of claim 7, wherein said amount of said additive comprises from 3% to 6% by weight of said plastic composition.
9. The method of claim 7, wherein said additive comprises 52 parts by weight of high molecular weight, high density polyethylene, 48 parts by weight of polyvinylidene fluoride and 56 grams of aluminium stearate per hundred pounds (45.4 kilograms) of said additive.
10. A thermoplastic additive for reducing the permeability of high molecular weight, high density polyethylene to fluids, said additive comprising said high molecular weight, high density polyethylene, polyvinylidene fluoride, and aluminium stearate.
11. The additive of claim 10 comprising 52 parts by weight of high molecular weight, high density polyethylene, 48 parts by weight of polyvinylidene fluoride and 56 grams of aluminium stearate per hundred pounds (45.4 kilograms) of said additive.

20 3 7 5 7 2

12. A liner for a container capable of resisting the permeation of fluids, said liner being comprised of the composition of Claim 1.

13. A liner for a container capable of resisting the permeation of fluids, said liner being comprised of the composition of Claim 2.

14. A liner for a container capable of resisting the permeation of fluids, said liner being comprised of the composition of Claim 3.

15. A container having the liner of Claim 12.

16. A container having the liner of Claim 13.

17. A container having the liner of Claim 14.