Repellent Polymer Melt Additive
PM-870

Product Bulletin

Introduction

3M™ Repellent Polymer Melt Additive PM-870 is a fluorochemical flake for incorporation into polyolefin and other synthetic resins. When PM-870 is properly precompounded, blended and extruded with the host resin, the result is a substrate that is repellent to water or other low surface tension liquids. At levels above 1.25 weight percent, repellency of up to a 2 oil can be achieved (performance based upon 3M Oil Repellency Test III). Water repellency of 70% to 90% isopropanol solutions can also be achieved.

PM-870 is heat and shear stable to a wide variety of extrusion conditions. It can be used to form a repellent substrate without wet processing, thus no solvents or wetting agents are needed. Various extrusion processes can make repellent films, fabrics, molded parts or fibers when incorporating PM-870. Continuous filament can be chopped into staple fiber and carded to form a repellent web.

PM-870 can be used in a wide range of polyolefin resins (8-1200 MFR). Extended use does not cause build up on the die face.

Note: This product is not intended for use in materials or products subject to prolonged or repeated contact with intimate body areas such as diaper, feminine hygiene, or adult incontinence products. If you have questions about appropriate uses or limitations of this product, contact your 3M sales professional.

Note: The active ingredient of PM-870 is not a chlorofluorocarbon (CFC), and it is not associated with ozone depletion.

Typical Properties

- Appearance ............................................... Amber Soft Solid Flake
- Melting Point ............................................ 80 - 110°C (176-230°F)
- Thermal Stability ...................................... Stable up to 300°C (572°F)
  (TGA in air @ 10° C/min)
- Solids ...................................................... 100%
- Bulk Density ............................................ 0.96 KG/L (8.01 lbs/gal)
- Typical Use Levels .................................. 1.250-2.0%
- Shipping & Storage ................................. Non Regulated

Do not store PM-870 at temperatures higher than 50°C (122°F) for extended periods of time. Prolonged exposure to such temperatures may damage the 3M product, by causing the flakes to adhere together.
General Compounding Information

3M™ Repellent Polymer Melt Additive PM-870 can be easily compounded in concentrations up to 10% in carrier resin using a twin-screw compounding extruder. Because of the relatively low melting temperature of PM-870 compared to polypropylene, it is difficult to obtain a concentrate using a single-screw extruder. Melting and subsequent lubrication in the feed section of the extruder will occur, leading to loss of feed.

For best results when preparing the concentrate, add the fluorochemical downstream from the polymer melting zone. The following methods are acceptable:
1) Use a side feeder for downstream feed of the fluorochemical.
2) Melt the fluorochemical and inject the molten additive downstream using a piston pump.

Both methods give good incorporation of the additive at concentrations up to 10%. At concentrations above 10%, strand pelletizing becomes difficult due to low melt strength and subsequent breaking of the strands. Underwater pelletizing gives best results at higher concentrations.

For additional information on compounding melt additives, please contact your 3M sales or technical service representative.

Application

Use of a concentrate is necessary to attain a uniform distribution of the fluorochemical additive in the extruded or molded form.

Recommended application levels depend on the final desired properties. Addition at 1.25 weight percent or higher gives a low surface energy substrate that is hydrophobic (for example, a polypropylene nonwoven). Extrusion conditions and resin type may determine the optimum treatment levels.

PM-870 is designed to be compatible with synthetic resins at extrusion temperatures. Consequently, the additive can localize at the surface during quenching or within a few hours to provide an effective surface-active treatment, while not significantly influencing fiber properties.

Surface properties such as fiber modulus and repellency can be reduced if extrusion temperatures are too high. Surface properties may be increased by reducing the polymer molecular weight (increasing the melt flow rate) and/or decreasing the fiber diameter. Annealing processes such as embossing or heat setting decrease repellency performance until the FC orientates at the surface. This may take 2 to 4 hours depending on the application level. Increasing the concentration of PM-870 increases alcohol repellency and can decrease the time for repellent properties to appear. Alternatively one can add 3 to 5 weight percent polybutylene, when making melt blown fibers, without increasing the PM-870 concentration. This will help minimize the delay in achieving water repellency.

Product Performance

The water repellency of untreated polypropylene is limited to a 20% isopropanol solution. Repellency to 70–90% isopropanol solutions can be achieved at a concentration of approximately 1.25 weight percent in various polypropylene resins.

The oil repellency for untreated polypropylene is virtually non-existent. When using levels of 1.25 weight percent repellency up to a 2 oil can be achieved. (Performance based upon 3M Oil Repellency Test III). Barrier properties of protective webs increase with increasing fluorochemical concentration for a given web geometry. The web geometry itself plays an important barrier role.
Environmental

This product is not made with, nor does it degrade to, PFOA (perfluorooctanoic acid) or PFOS (perfluorooctane sulfonate).

The new 3M fluorochemical technology, used in PM-870, has passed the regulatory reviews of the U.S. EPA and other environmental agencies around the world. As such, PM-870 has been deemed acceptable for commercial sale and use in the United States and many other countries around the world.

Before using this product, please read the current product Material Safety Data Sheet (available through your 3M sales or technical service representative) and the precautionary statement on the product package. Follow all applicable precautions and directions.

Important Notice to Purchaser: The information in this publication is based on tests that we believe are reliable. Your results may vary due to differences in test types and conditions. You must evaluate and determine whether the product is suitable for your intended application. Since conditions of product use are outside of our control and vary widely, the following is made in lieu of all express or implied warranties (including the warranties of merchantability or fitness for a particular purpose): Except where prohibited by law, 3M’s only obligation and your only remedy, is replacement or, at 3M’s option, refund of the original purchase price of the product that is shown to have been defective when you received it. In no case will 3M be liable for any direct, indirect, special, incidental, or consequential damages (including, without limitation, lost profits, goodwill, and business opportunity) based on breach of warranty, condition or contract, negligence, strict tort, or any other legal or equitable theory.