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## DuPont™ Capstone™ Products – An Overview

### Capstone™ - A New Generation of Short-Chain Surface Protection Products

DuPont has developed a new line of surface protection products based on sustainable short-chain technologies, (six or less fluorinated carbons), that deliver superior performance, supported by extensive environmental, health and safety testing. Capstone™ products cannot break down into PFOA in the environment.

#### A Leader in Surface Protection

DuPont has a history of more than two hundred years of safety and innovation. DuPont researchers have repeatedly put science to work creating products that deliver exceptional value and performance for customers. Guided by corporate core values and sustainability goals, DuPont assess the entire product life cycle including workers, consumers and the environment. DuPont scientists have conquered the challenge of developing surface protection products that deliver the performance expected by customers, which also have favorable environmental, health and safety characteristics.

#### A Foundation of Knowledge

Before commercialization, DuPont conducts rigorous reviews for every Capstone™ product. Scientists evaluate how a product will be used. They also evaluate how workers, consumers and the environment may be exposed. Extensive studies on hazards, exposure and environmental fate are conducted on Capstone™ products and on the raw materials and degradation products. The study data provides a solid foundation of knowledge that gives confidence in the safety of DuPont products for their intended uses with minimal to no environmental impact.

### Product Chemistry

The functionality in Capstone™ products that delivers the product performance is a short-chain fluorocarbon (FC) consisting of six or less carbons  $[F(CF_2)_n-]$  where  $n \leq 6$  bound to a “delivery system” such as a polymer or surfactant.

#### Not All C6 Is The Same

It is very important to know that Capstone™ products made from raw materials with six fluorinated carbons, sometimes commonly call “C6”, are unique and completely different in chemistry, and environmental, health and safety profile from “C6” electrochemical fluorination (ECF) – based sulfonyl products such as perfluorohexane sulfonate. Moreover, DuPont™ Capstone™ products cannot break down into PFHxS. Substantial scientific study data confirms this. Clearly, not all “C6” chemistry is “the same”. Furthermore, the environmental, health and safety profile of the degradation product PFHxA is as good as or better than new degradation products from alternative “C4” chemistry: perfluorobutanoic acid (PFBA) and perfluorobutane sulfonate (PFBS).

#### Environmental, Health and Safety Profile – A significant step forward

Extensive toxicology (hazards) studies have been conducted on Capstone™ products, raw materials and a potential degradation product, perfluorohexanoic acid (PFHxA). The toxicological assessments included mammalian acute, sub-chronic, reproductive and developmental toxicity, aquatic toxicity, and biopersistence studies. A very important criteria is the tendency of a product or degradation product to bioaccumulate or be biopersistent in living systems. The study results indicate that Capstone™ products and PFHxA have very low biopersistence and are not



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bioaccumulative according to any global regulatory criteria. The overall toxicological and biopersistence properties of DuPont™ Capstone™ products are a significant step forward in overall environmental profile and sustainability.

The scientific studies conducted by DuPont have been openly shared in presentations at international scientific conferences and publications in peer-reviewed scientific and trade journals. The specific hazards for each Capstone™ product are given on the individual product MSDS.

In addition, toxicology studies specific to a particular product use and exposure profile are conducted as needed (for example: inhalation). Ask your DuPont sales or technical representative for more information.

### Favorable Product Environmental Profile

The environmental profile of Capstone™ products is very important. Specific attention is given to the composition of DuPont™ Capstone™ products. Residual unreacted raw materials and by-products, such as PFHxA, have been minimized using patented manufacturing technology. The removal of residual raw materials and by-products minimizes the environmental footprint of Capstone™ products.

DuPont has conducted numerous scientific studies to assess the environmental fate of products and raw materials. These studies provide a foundation of knowledge for Capstone™ products regarding their ultimate fate from industrial and consumer use and disposal. For example, the potential degradation product of six fluorinated carbon [F(CF<sub>2</sub>)<sub>6</sub>-] functionality, perfluorohexanoic acid (PFHxA), has very low biopersistence, low toxicity and would not be considered to bioconcentrate or be

bioaccumulative according to global regulatory criteria.

### Regulatory

Capstone™ products are registered and approved for sale in the countries in which they are sold. In the United States, products are manufactured and sold under consent orders with the U.S. Environmental Protection Agency (EPA) and meet DuPont's voluntary commitment to the U.S. EPA 2010/15 PFOA Stewardship Program. Moreover, the necessary REACH pre-registrations are being made for Capstone™ products.

### Summary

Capstone™ products provide sustainable, high value-in-use solutions for surface protection needs. Capstone™ products are created upon a foundation of knowledge demonstrating a favorable environmental, health and safety profile.

As a leader in surface protection solutions, DuPont continues to develop innovative, new, sustainable products that deliver maximum performance and continue to reduce the environmental footprint along the value chains in which the products are used.

To learn more about DuPont™ Capstone™ products, please contact:

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