



Received by NOP  
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National List Coordinator  
USDA/AMS/NOP, Standards Division  
1400 Independence Ave. SW  
Room 2646-So., Ag Stop 0268  
Washington, DC 20250-0268

RE: Petition for the inclusion of Polyalkylene Glycol Monobutyl Ether (CAS No. 9038-95-3) on the National List at §205.605 as a non-agricultural (nonorganic) substance allowed as an ingredient in or on processed products labeled as "organic" or "made with organic (specified ingredients or food group(s))."

Dear National List Coordinator,

Pellet Products, Inc. produces EcoBlend FG®, a product formulated for use in livestock feed pellet mills that is comprised of polyalkylene glycol monobutyl ether (CAS #9038-95-3) and softened water. Pellet Products has provided this product to the livestock feed mill industry for 23 years. Without the use of a material such as polyalkylene glycol monobutyl ether in the pelleting process, pellet quality is lowered in terms of hardness, pellet durability and digestibility creating a negative affect in feed conversion and growth rate in livestock. The nutritional benefit to livestock is increased with the higher quality pellets produced in mills using this material as a boiler steam additive and in addition reduces waste of valuable and costly organic ingredients.

This material has been approved by FDA as a secondary direct additive to reduce, retard or prevent mineral scaling within the steam boiler; and has been approved under 21CFR §173.310(c) as an acceptable material for addition to boiler water steam lines in the production of animal feed. Furthermore, polyalkylene glycol monobutyl ether is included in the August 2004 EPA List 4B – Inerts of Minimal Concern, listed as Polyethylene-polypropylene glycol, monobutyl ether (CAS No. 9038-95-3) and is exempted from the requirement of a tolerance limit per 40CFR §180.960.

The structure of the National List is such that there is not a specific section for processing aids used in the production of animal feed therefore our petition requests inclusion on the National Organic Program National List §205.605(b) but not for use in production of food for human consumption. Pellet Products is requesting that polyalkylene glycol monobutyl ether (CAS #9038-95-3) be allowed for the restricted use as a boiler steam additive for use in organic feed pellet mills and be further restricted to a minimum molecular weight of 1,500 in accordance with the conditions required by 21CFR §173.310.

Our petition and its appendices provide answers to all of the questions in the Guidelines on Procedures for Submitting National List Petitions, and in a manner that satisfies the criteria in the OFPA. We are available to provide any additional information that is required to complete your review process and recommendation.

Sincerely,

A handwritten signature in black ink, appearing to read "James H. Hinderliter".

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products labeled as “organic” or “made with organic (specified ingredients or food group(s))”**

**INTRODUCTION**

**ITEM A**

This petition seeks the inclusion of Polyalkylene Glycol Monobutyl Ether (CAS No. 9038-95-3) on the National List at §205.605 as a non-agricultural (nonorganic) substance allowed as an ingredient in or on processed products labeled as “organic” or “made with organic (specified ingredients or food group(s)).”

The petition is solely for the use of Polyalkylene Glycol Monobutyl Ether (CAS No. 9038-95-3) with a minimum molecular weight of 1,500 in accordance with the conditions required by 21 CFR §173.310 as a boiler additive for use in feed pellet mills.

**ITEM B**

**1. The substance’s chemical or material common name.**

The chemical name is Polyalkylene Glycol Monobutyl Ether.

Alternate names are:

Polyethylene-polypropylene glycol, monobutyl ether  
Poly(ethylene glycol-co-propylene glycol) monobutyl ether  
Poly(ethylene glycol-ran-propylene glycol) monobutyl ether  
Oxirane, methyl-, polymer with oxirane, monobutyl ether  
Methyl oxirane polymer with oxirane monobutyl ether

**2. The manufacturer’s or producer’s name, address and telephone number and other contact information of the manufacturer/producer of the substance listed in the petition.**

The Dow Chemical Company  
2030 Willard H. Dow Center  
Midland, MI 48674 USA  
(800) 258-2436  
[www.dow.com](http://www.dow.com)  
Dow UCON®50-HB Series (-660, -2000, -3520, -5100)

Huntsman Corporation  
10003 Woodloch Forest Drive  
The Woodlands, TX 77380  
(281) 719-6000  
[www.huntsman.com](http://www.huntsman.com)  
JEFFOX® WL-5000 Functional Fluid

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- 3. The intended or current use of the substance such as use as a pesticide, animal feed additive, processing aid, nonagricultural ingredient, sanitizer or disinfectant.**

Polyalkylene glycols (PAGs) are a diverse group of polymeric materials with a long history and broad spectrum of uses, including but not limited to anti-foam agents, quenching agents, lubricants, mold release agents, cosmetic oil substitutes, and pharmaceutical applications. This petition is for the inclusion of Polyalkylene Glycol Monobutyl Ether (CAS No. 9038-95-3) in §205.605 as a boiler steam additive for use in feed pellet mills. While polyalkylene glycol monobutyl ether may be produced with varying molecular weights, this petition is specific to those with a minimum molecular weight of 1,500 in accordance with the conditions required by 21CFR §173.310.

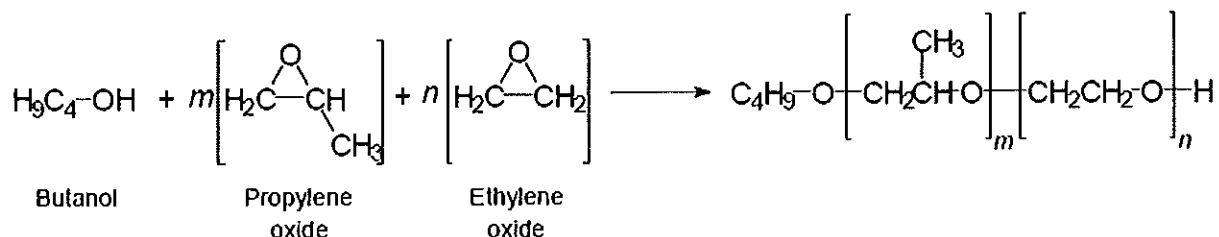
- 4. A list of the crop, livestock or handling activities for which the substance will be used.**

Polyalkylene glycol monobutyl ether is used in a manner that is consistent with 21CFR §173.310 and is applied directly to the steam boiler systems in use at pellet mills.

Polyalkylene glycol monobutyl ether exhibits the property of inverse solubility. In other words, its solubility in water decreases as the solution temperature rises. At a temperature known as the cloud point, the polyalkylene glycol monobutyl ether comes out of solution and forms a turbid dispersion. Due to this inverse solubility property, polyalkylene glycol monobutyl ether functions as both a lubricant and as a surfactant within the pelleting process. With an approximate application rate of 1-3.5 fluid oz. per ton of feed produced, the consistent use of polyalkylene glycol monobutyl ether causes reduced friction of the material moving through the die which can result in up to 60% longer die life. This increased lubricity also allows for increased mash temperatures by 10° - 40°F through the addition of supplementary steam and moisture, which in turn reduces roll slippage and increases through-put by anywhere from 14 – 20% based on the feed formula being utilized. As a surfactant, the polyalkylene glycol monobutyl ether, along with the increased mash temperature, has proven to increase the Pellet Durability Index (PDI) while reducing fines by 8 – 20%. We are unaware of any other processing aids meeting FDA requirements that can provide similar results.

- 5. The source of the substance and a detailed description of its manufacturing or processing procedures from the basic component(s) to the final product.**

Polyalkylene glycol monobutyl ether is produced by reacting an equal amount by weight of ethylene oxide and propylene oxide with butanol acting as a catalyst at temperatures between 100°C and 150°C. The result is a random copolymer with the general structure below:



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- 6. A summary of any available previous reviews by State or private certification programs or other organizations of the petitioned substance. If this information is not available, the petitioner should state so in the petition.**

In 1992, Union Carbide Corporation, now a wholly owned subsidiary of The Dow Chemical Company, submitted a report entitled “Studies Into the Mechanism of Action of Convulsive Seizures Produced by UCON 50-HB-400” to U.S. EPA pursuant to the Toxic Substances Control Act (TSCA) §8(e) Compliance Audit Program. While these studies were performed in reference to a product that does not fall within the scope of this petition, one product which does meet the requirements of 21CFR §173.310 — UCON 50-HB-5100, a polyalkylene glycol monobutyl ether product with a molecular weight of 3,930 — was included in the study. The data produced in this study showed that rats treated with UCON 50-HB-5100 showed no convulsions or any degree of central nervous system stimulation, whether administered intraperitoneally or orally. See Appendix A.

- 7. Information regarding EPA, FDA, and State regulatory authority registrations, including registration numbers. If this information does not exist, the petitioner should state so in the petition.**

Per 21CFR §173.310, compounds prepared with monobutyl ethers of polyethylene-polypropylene glycol produced by random condensation of a 1:1 mixture by weight of ethylene oxide and propylene oxide with butanol are permitted as boiler water additives used in the preparation of steam that will contact food, provided that the molecular weight is at least 1,500 and the amount used is not in excess of that required for its functional purpose, and the amount of steam in contact with food does not exceed that required to produce the intended effect in or on the food.

Polyalkylene glycol monobutyl ether is included in the August 2004 EPA List 4B – Inerts of Minimal Concern, listed as Polyethylene-polypropylene glycol, monobutyl ether (CAS No. 9038-95-3) and is exempted from the requirement of a tolerance limit per 40CFR §180.960.

- 8. The Chemical Abstract Service (CAS) number or other product numbers of the substance and labels of products that contains the petitioned substance.**

The Chemical Abstract Service (CAS) No. for polyalkylene glycol monobutyl ether is 9038-95-3. A product label for EcoBlend FG is attached as Appendix B.

- 9. The substance’s physical properties and chemical mode of action**

**(a) Chemical interactions with other substances, especially substances used in organic production;**

Polyalkylene glycols are incompatible with strong acids, strong bases and strong oxidizers; contact with these materials should be avoided.

Polyalkylene glycols have been found to be inherently more resistant to certain types of flame propagation than hydrocarbons and are thus used in numerous applications where fire-

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resistance is necessary. They are widely used in the presence of rubber because of the negligibly low solvent or swelling effect they exert toward most types of natural and synthetic rubber. Under degenerative oxidation conditions, they tend to break down into volatile decomposition products rather than to crack and polymerize or resinify as is the case with mineral oils. It is because of this latter characteristic that these fluids have been found to have unusual resistance to the formation of sludge gum, varnish and carbon.

**(b) toxicity and environmental persistence;**

Toxicity by ingestion is low. The toxicity is highest for the lower molecular weight products. Measured LD50 values range from a low of about 4 mL/kg to over 60 mL/kg when rats were used as the test animal. Long-term feeding studies done on dogs and rats have shown minimal effects.

Toxicity by skin contact is low. Toxicity by absorption is generally very low. LD<sub>50</sub> values by this route generally exceed 10 mL/kg. Skin sensitization is a function of molecular weight, with the lower molecular weight fluids showing the greatest effect. In general, the effects, if any, are transient redness of the skin.

Because of the low vapor pressure of polyalkylene glycols toxicity by inhalation is generally very low. For the higher molecular weight copolymers of ethylene oxide propylene oxide that are monbutyl ethers, however, mechanically generated mists were found to be toxic upon inhalation. Mechanical ventilation should be reviewed where mists or thermal degradation products are likely to be present. Eye injury is expected only for the lowest molecular weight polyalkylene glycols. The lower molecular weight fluids cause slight to moderate eye injury.

The effect of polyalkylene glycols on aquatic animals is low. The table in Appendix C shows the effects on fathead minnows and on *Daphnia magna*. The largest effects are with the water-insoluble polypropylene glycol monobutyl ethers. The water-soluble products can have effects that are very low, with negligible effects on the environment expected. This advantage is important when combined with biodegradation rate. A slowly biodegraded polymer that has very low toxicity presents a very low risk to the environment.

Polyalkylene glycols are biodegradable, but the speed of degradation depends on molecular weight. The lower molecular weight polyalkylene glycols biodegrade very readily. The higher molecular weight fluids biodegrade, but the biodegradation is slower, probably because transport across bacterial membranes is slow for large molecules.<sup>1</sup>

**(c) environmental impacts from its use and/or manufacture;**

To our knowledge, there are no studies on the environmental impacts of the use and/or manufacture of polyalkylene glycol monobutyl ether except as noted in 9(b) above.

Ethylene oxide is highly flammable and has a wide flammable range in air of 3.0–100%. It can explosively decompose if exposed to an ignition source. The flammability is only heightened by a

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<sup>1</sup> Rudnick, Leslie R., and Ronald L. Shubkin. *Synthetic Lubricants and High-Performance Functional Fluids*. New York: Marcel Dekker, 1999.

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boiling point of 10.4°C, making it a gas at ordinary temperatures. It can be polymerized with acidic, basic, and coordination catalysts, a polymerization that is very exothermic. A very careful study of the hazards and procedures for safely handling ethylene oxide must be undertaken before the use of this substance is attempted. Similar hazards exist with propylene oxide.

**(d) effects on human health;**

Polyalkylene glycols generally present a low toxic hazard and have been safely used for many years. However, there have been aerosol inhalation studies in experimental animals that have revealed the lung as a target organ for some of these copolymers as evidenced by the following abstracts from Drug and Toxicology and from the European Centre for Ecotoxicology and Toxicology of Chemicals.

Acute Inhalation Toxicity Studies in Several Animal Species of an Ethylene Oxide/propylene Oxide Copolymer (UCON 50-HB-5100) (Hoffman *et al.*, Drug and Chemical Toxicology, Vol. 14, No. 3, pages 243-256, 1991)

**Abstract**

*A study was conducted to assess the acute inhalation toxicity and estimate the median lethal concentration of UCON-50-HB-5100 (9038953) to five species of animals: Sprague-Dawley-rats, CD-1-mice, Hartley-albino-guinea-pigs, Golden-Syrian-hamsters and beagle-dogs. Animals were exposed by inhalation to UCON-50-HB-5100 at concentrations of 0, 50, 100, 200 or 500mg/m<sup>3</sup> for 4 hours. Exposures resulted in the death of mice and rats exposed at the three highest dose levels. Guinea-pigs died at the two highest dose levels while hamsters died only at the highest dose level. The exposures resulted in some delayed mortalities in rodents, apparently the result of pulmonary congestion, edema, hemorrhage, and inflammation; these were considered to be the major factors causing the deaths of the animals. Dogs did not show any mortality, and some increases in lung weights were seen only at the highest exposure level. The most sensitive species appeared to be mice and rats, followed in descending order by guinea-pigs, hamsters and dogs. Median lethal concentrations were 147mg/m<sup>3</sup> for rats, 174mg/m<sup>3</sup> for mice, 293mg/m<sup>3</sup> for guinea-pigs, and 511mg/m<sup>3</sup> for hamsters.*

Two-Week Aerosol Inhalation Study in Rats of Ethylene Oxide / Propylene Oxide Copolymers. (Ulrich *et al.*, Drug and Chemical Toxicology, Vol. 15, No. 1, pages 15-31, 1992)

**Abstract**

*Previous studies have shown that aerosols of an ethylene oxide/propylene oxide copolymer (UCON 50-HB-5100) produced an inflammatory response in lungs of rats in short-term repeated exposures at relatively low concentrations. This study was carried out on related polyalkylene glycols (EO/PO copolymers) to determine if similar effects would occur upon short-term repeated exposure. Rats were treated by whole body liquid droplet aerosol exposures of six hours per day, five days per week for two consecutive weeks to each of five EO/PO copolymers. The exposure level for the positive control (UCON 50-HB-5100) was 55 mg/m<sup>3</sup>, while the remaining 4 test copolymers were evaluated at 100 mg/m<sup>3</sup>. Each exposure group consisted of ten male albino rats. After three exposures, nine of ten rats exposed to UCON 50-HB-5100, and six of ten rats exposed to UCON 50-HB-2000 had died. At*

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*necropsy, congestion, consolidation and red discoloration of the lungs were noted. A moderate to severe alveolitis, characterized by Intraalveolar edema, hemorrhage and fibrin deposition, was observed after five days of exposure. At necropsy, these rats exhibited elevated lung weights and similar macroscopic and microscopic lesions. Rats exposed to the other test materials (UCON 75-H-1400, Pluronic L17R1, Pluronic L31, and Pluronic L64) survived with essentially no signs of toxicity through the ten exposure days. Body weights, organ weights, hematological evaluation, pharmacotoxic signs, and macroscopic and microscopic evaluation after necropsy were similar between groups and when compared to the negative control group. Only a slight alveolitis was noted after two weeks of exposure which subsided by two-weeks post exposure.*

**Pulmonary Toxicity of Polyalkylene glycols (ECETOC Technical Report Vol:55 (1997) 54 p)**

*Polyalkylene glycols (polyglycols; PAG) are a group of polymeric chemicals with a wide range of physicochemical properties and applications. No significant adverse health effects arising from industrial experience over many years have been reported for these chemicals. PAG have low vapour pressures and no adverse effects have been reported following exposure to vapour atmospheres at ambient temperature. Experimental animal studies involving a range of PAG have revealed, however, that inhalation of aerosols can, in some cases, lead to severe delayed toxic effects in the lung. A review of the data shows that these toxic effects are confined to two areas of PAG chemistry and differ only in severity of the responses seen. In acute toxicity studies certain butanol and water-initiated random 50:50 ethylene oxide-propylene oxide (EO-PO) copolymers of molecular weight 2,900 and greater induce significant toxic changes in the rat lung including congestion, haemorrhage, interstitial pneumonia and Type II pneumocyte hyperplasia; interstitial facial fibrosis occurs after longer exposure. In sub-acute toxicity studies similar though less severe changes are seen in the lung with 1,700 molecular weight copolymers of similar composition; certain block and reverse-block EO-PO copolymers of molecular weight 1,100 and greater show similar, though less severe changes in the lung. Acute aerosol inhalation toxicity data on other PAG (diol- and triol-initiated polymers and copolymers and copolymers with different proportions of EO and PO) demonstrate that this pattern of lung toxicity is not general for PAG. The underlying reasons for the apparent specificity in chemical composition responsible for the observed effects have not been demonstrated. Ultrastructural studies conducted after exposure of rats to random copolymers have suggested that the Type I pneumocytes lining the alveoli are the primary target cell. For random copolymers the available information points to the uptake of circulating unmetabolised copolymer into lung epithelial cells by an active transport mechanism. In view of these findings, it is recommended that inhalation exposure to those PAG copolymers, shown to have adverse lung effects in animal studies, is adequately controlled where there is the possibility of aerosol generation in the workplace.*

Ethylene oxide is a toxic material with a time-weighted average for 8 hours of exposure of 1 ppm and a short-term permissible limit of 5 ppm in a 15-minute period, as determined by the federal Office of Occupational Safety and Health (OSHA).

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**(e) effects on soil organisms, crops, or livestock.**

Polyalkylene glycols present a very low risk to bacteria, as shown in Table 20, Appendix C.

Because of their low degree of toxicity, polyalkylene glycols have been approved for a variety of uses where they might come into contact with food and feed. These include the use in lubricants that are used to manufacture and otherwise process food (21 CFR 178.3570) and in a variety of foam control applications. Therefore no negative effects on livestock are expected.

**10. Safety information about the substance including a Material Safety Data Sheet (MSDS) and a substance report from the National Institute of Environmental Health Studies.**

A Material Safety Data Sheet and a Product Safety Assessment for UCON™ Lubricant 50-HB-3520 (polyalkylene glycol monobutyl ether) is attached as Appendix D. To our knowledge, a specific National Institute of Environmental Health Studies report on polyalkylene glycol monobutyl ether does not exist.

**11. Research information about the substance which includes comprehensive substance research reviews and research bibliographies.**

Polyalkylene glycols provide good lubricity in by taking advantage of their inverse solubility in water. At ambient temperatures, polyalkylene glycols are water soluble. At an elevated temperature, known as the “cloud point,” the polyalkylene glycol becomes insoluble and forms small polymer droplets. When the polyalkylene glycol is brought into contact with a hot die or cutting tool, it is heated to a temperature above the cloud point of the polymer. The polyalkylene glycol then comes out of solution. The resulting polyalkylene glycol droplets coat the surfaces of the hot die or cutting tool, forming a lubricant film that provides excellent hydrodynamic lubricity.<sup>2</sup>

To the best of our knowledge, there are no other relevant research reviews for polyalkylene glycol monobutyl ether other than what is presented here and within Section 9 of this petition.

**12. A “Petition Justification Statement” which provides justification for any of the following actions requested in the petition:**

One of the primary objectives of all commercial feed manufacturers is to economically produce the best pellet quality possible. This is not only important from a customer satisfaction standpoint, but it is apparent that animal performance can be affected by pellet quality. Without the use of a material such as polyalkylene glycol monobutyl ether in the pelleting process, pellet quality is lowered in terms of hardness, pellet durability and digestibility creating a negative affect in feed conversion and growth rate in the livestock.

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<sup>2</sup> Rudnick, Leslie R., and Ronald L. Shubkin. *Synthetic Lubricants and High-Performance Functional Fluids*. New York: Marcel Dekker, 1999.



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The physical quality of feed pellets is important for a number of reasons. First of all, transportation and handling in both the factory and on the farm require pellets of a certain integrity without fines produced by attrition stresses. Pellets of high physical quality must have properties which give a high nutritional quality for example in terms of higher feed intake and, perhaps, improved nutritional value (Skoch et al., 1983; Stevens, 1987; Koopmans et al., 1989a; Koopmans et al., 1989b).<sup>3</sup>

Pellets also need to have a basic form of physical quality in terms of e.g. hardness and durability to withstand the rigors of transportation. Hardness is the force necessary to crush a pellet or a series of pellets at a time; durability is the amount of fines returning from pellets after being subjected to mechanical or pneumatic agitation. Such quality parameters can also be used to evaluate the effects of diet formulation, conditioning, expander treatment, pellet binders, die selection, etc. (Pfof, 1963).<sup>4</sup>

More importantly, “Research shows that feed conversion of swine and poultry decreases as pellet fines increase [Schell, van Heugten, 1998; Zafari, Ferket, Scheideler, 1990].”<sup>5</sup> Therefore, it is very important for feed manufacturers to ensure that the pellet quality for these livestock is high in order to avoid excess fines.

With an approximate application rate of 1-3.5 fluid oz. per ton of feed produced, the consistent use of polyalkylene glycol monobutyl ether during pelleting causes reduced friction of the material moving through the die which can result in up to 60% longer die life. This increased lubricity also allows for increased mash temperatures by 10° - 40°F through the addition of supplementary steam and moisture, which in turn reduces roll slippage and increases through-put by anywhere from 14 – 20% based on the feed formula being utilized. As a surfactant, the polyalkylene glycol monobutyl ether, along with the increased mash temperature, has proven to increase the Pellet Durability Index (PDI) while reducing fines by 8 – 20%.

Depending upon the raw ingredients used and their initial quality, the higher temperatures and the ability to add supplemental moisture afforded by the use of polyalkylene glycol monobutyl ether, gelatinization of starch is increased which in turn optimizes the digestibility of the pelleted feed.

Gelatinization is defined as “the complete rupture of the starch granule, brought about by a combination of moisture, heat and pressure and (in some instances) a mechanical shear.”

Basically, gelatinization of starch has two results important to digestion:

1. Gelatinization enhances the ability of starches to absorb large quantities of water and this leads to improved digestibility in almost all cases and improved feed conversion in many cases.

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<sup>3</sup> *Physical quality of pelleted animal feed. 1. Criteria for pellet quality.* Thomas, M., AFB van der Poel. *Animal Feed Science Technology* 61 (1996) 89-112.

<sup>4</sup> *Physical quality of pelleted animal feed. 1. Criteria for pellet quality.* Thomas, M., AFB van der Poel. *Animal Feed Science Technology* 61 (1996) 89-112.

<sup>5</sup> Fairfield, D.A., National Grain and Feed Association Feed and Feeding Digest, Volume 54, Number 6, November 13, 2003.

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2. Gelatinization increases the speed at which enzymes (amylases) can break down the linkages of starch, thus converting starch into simpler and more soluble carbohydrates.

Gelatinization of starch is a process by which the intermolecular bonds of the starch molecules are broken down by the presence of heat and water allowing nearly all amylose, a form of starch that is resistant to digestion, to leach into the surrounding water. This exposes more of the amylose to alpha-amylase, the enzyme that digests amylose.

When limited amounts of water or other solvents are present, more heat is needed to complete gelatinization and gelatinization occurs over a wider temperature range (Sun et al., 2002). As most feed processing treatments take place under conditions with low water contents, this implies that much heat is needed for starch to gelatinize during feed processing.<sup>6</sup>

In addition to the importance for starch digestion, the increase in viscosity during gelatinization may also affect physical quality of processed feeds positively through increased binding between particles. This is evidenced by the increase in pellet durability index (PDI). Polyalkylene glycols are the only lubricants available with water solubility. They are exceptionally clean lubricants, allowing use where petroleum products would build tars and sludges, making them an excellent alternative for die protection and increased throughput.

To our knowledge current practices used to produce organic feed pellets without polyalkylene glycol monobutyl ether are limited to the use of glycerin and/or soy oil added to the diet formulation as a lubricant. Research has shown that these materials do reduce motor amp loads by 0.5-3%, providing a minor cost savings. The addition of glycerin only slightly improved Pellet Durability Index (approximately 2-5%), while formulations containing soy oil or a blend of soy oil and glycerin have been shown to exhibit a negative impact on pellet durability (a decrease of 1-3%).<sup>7</sup>

The use of glycerin and/or soy oil appears to be limited to providing lubrication and does not allow for increasing the mash temperature through the addition of supplemental steam and moisture. When conditioning temperatures were increased during trials, the pellet mill rolls began to slip, resulting in the plugging and overloading of the pellet mills.<sup>8</sup>

In contrast, the addition of polyalkylene glycol monobutyl ether allows for increased mash temperatures by 10°-40°F through the addition of supplementary steam and moisture, thus increasing the gelatinization of starch which improves the digestibility of the pelleted feed, increases Pellet Durability Index and the reduction of fines.

The only other option available to organic feed pellet producers is to use nothing at all. However, without the use of a material such as polyalkylene glycol monobutyl ether in the pelleting process,

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<sup>6</sup> *Effect of starch granule structure, associated components and processing of nutritive value of cereal starch: A Review*, Svihus, B. et al, *Animal Feed Science and Technology* 122 (2005) 303-320.

<sup>7</sup> *Effect of Glycerol on Pellet Mill Production Efficiency*. Grosbeck, C.N. et al. Swine Day 2007.

<sup>8</sup> *Utilizing Glycerol in Swine and Poultry Diets: I. Feed Manufacturing Considerations and II. Nutritional Consequences*. McKinney, L.J., Department of Grain Science and Industry, Kansas State University. February 10, 2009.

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pellet quality is lowered in terms of hardness, pellet durability, and digestibility creating a negative effect in feed conversion and growth rate of livestock. Not only is the nutritional benefit to livestock increased with the higher quality pellets produced in mills using polyalkylene glycol monobutyl ether as a boiler steam additive, but addition of this material also increases yield and reduces waste of valuable and costly organic ingredients.

**13. A Confidential Business Information Statement which describes the specific required information contained in the petition that is considered to be Confidential Business Information (CBI).**

This petition contains no confidential business information.

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## **Appendices**

- A. Union Carbide Corporation *“Studies Into the Mechanism of Action of Convulsive Seizures Produced by UCON-HB-400”*, Mellon Institute of Research, Report 25-43, May 28, 1962, submitted to EPA August 27, 1992.
- B. EcoBlend FG label
- C. Table 20, *Environmental Effects of Polyalkylene Glycols from Synthetic Lubricants and High-Performance Functional Fluids*. Rudnick, Leslie R., and Ronald L. Shubkin. New York: Marcel Dekker, 1999.
- D. Material Safety Data Sheet UCON™ 50-HB-3520  
Product Safety Assessment UCON™ 50-HB Lubricants (High Molecular Weight)



"Contains NO CBI"

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UNION CARBIDE CORPORATION 39 OLD RIDGEBURY ROAD, DANBURY, CT 06817-0001

August 27, 1992

A

**CERTIFIED MAIL  
RETURN RECEIPT REQUESTED**

8EHQ-92-12122  
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Document Processing Center (TS-790)  
Room L-100  
Office of Toxic Substances  
U.S. Environmental Protection Agency  
401 M Street, SW  
Washington, DC 20460

Attn: Section 8(e) Coordinator (CAP Agreement)

Re: CAP Agreement Identification No. 8ECAP-0110

Dear Sir or Madam:

Union Carbide Corporation ("Union Carbide") herewith submits the following report pursuant to the terms of the TSCA §8(e) Compliance Audit Program and Union Carbide's CAP Agreement dated August 14, 1991 (8ECAP-0110). This report describes mechanism of action studies concerning convulsions produced by UCON® 50-HB-400 (CASRN 9038-95-3).

"Studies Into the Mechanism of Action of Convulsive Seizures Produced by UCON 50-HB-400", Mellon Institute of Industrial Research, Report 25-43, May 28, 1962.

A complete summary of this report is attached.

Previous TSCA Section 8(e) or "FYI" Submission(s) related to this substance are:

8EHQ-1086-0635

Previous PMN submissions related to this substance are: (None)

RECEIVED  
2/15/93

2

This information is submitted in light of EPA's current guidance. Union Carbide does not necessarily agree that this information reasonably supports the conclusion that the subject chemical presents a substantial risk of injury to health or the environment.

In the attached report the term "CONFIDENTIAL" may appear. This precautionary statement was for internal use at the time of issuance of the report. Confidentiality is hereby waived for purposes of the needs of the Agency in assessing health and safety information. The Agency is advised, however, that the publication rights to the contained information are the property of Union Carbide.

Yours truly,



William C. Kuryla, Ph.D.  
Associate Director  
Product Safety  
(203/794-5230)

WCK/cr

Attachment (3 copies of cover letter, summary, and report)

## SUMMARY

Confidential

Report 25-43

R: 5-28-62

HFJ  
5-29-62

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

SPECIAL REPORT

Studies Into the Mechanism of Action  
of Convulsive Seizures Produced by UCON 50-HB-400

Union Carbide Chemicals Co., U.C.C.

Industrial Fellowship 274-25

In order to study the physiological mechanisms responsible for the reported convulsions produced by UCON 50-HB-400, a few representative members of the 50-HB series were investigated. The chemicals studied were UCON 50-HB-55, 50-HB-260, 50-HB-400, and 50-HB-5100. All of these were studied in rats, mice, and frogs; while the latter two chemicals were also investigated in dogs.

None of the UCONS selected produced any excitatory effect in frogs, in fact, lethal doses were always preceded by marked central nervous system depression. This was an unfortunate finding as the frog lends itself well to a study of the central site of action.

Procter & Gamble data showed selective C.N.S. stimulation in rats for members of this series up to the 50-HB-660. Higher molecular weight members and members of the LB series failed to produce such symptoms. We have confirmed their findings and showed positive effect with the 50-HB-55, 50-HB-260, and 50-HB-400 UCONS, and negative effects with the 50-HB-5100 in mice (20-25 gm. females), and rats (200-250 gm. females). The minimal active dose in both species for these compounds was 0.5 ml./kg. administered intraperitoneally over a wide range of concentrations. Tremors were observed at lower doses. All four UCONS were also investigated for their ability to induce a convulsive seizure after oral administration to rats. Lethal doses of each were given to groups of five animals. All of the animals treated with 50-HB-55, 260, or 400 showed excitation or a definite well defined convulsion preceding death. Those animals treated with 50-HB-5100 (in doses as high as 64 ml./kg.) showed no convulsions or any degree of C.N.S. stimulation. No studies with lower oral doses of the UCONS were done. Pretreatment (30 minutes) of rats with diphenylhydantoin (50 mg./kg. I.P.), atropine (20 mg./kg. I.P.), or phenobarbital (25 mg./kg. I.P.), in nonsedating doses delayed but did not prevent death caused by 1.0 ml./kg. I.P. of the 50-HB-400. Another barbiturate (pento-barbital) in nonsedative (10 mg./kg.) or hypnotic (40 mg./kg.) I.P. doses, however, does prevent the convulsions and death produced by UCON 50-HB-400. Pretreatment with meprobamate (100 mg./kg. I.P.) which inhibits convulsions produced by many spinal convulsants, did not modify the response to the UCON.

Confidential

Report 25-43

A13

R: 5-28-62

1178  
5-29-62

MELLON INSTITUTE OF INDUSTRIAL RESEARCH

SPECIAL REPORT

Studies Into the Mechanism of Action

of Convulsive Seizures Produced by UCON 50-HB-400

AFDR  
Tremors  
convulsion

Union Carbide Chemicals Co., U.C.C.

Industrial Fellowship 274-25

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Based on these data, (failure of diphenylhydantoin to protect presumably negates a cortical site, failure of meprobamate to protect negates a spinal site) it appears that a medullary site of action is evident. Studies into the mechanism of such stimulation were performed in anesthetized dogs with an active UCON, (UCON 50-HB-400) and an inactive one (UCON 50-HB-5100).

In one dog, deeply anesthetized with pentobarbital (40 mg./kg. I.V.), a respiratory rate of 12 per minute was recorded before injection of 0.5 ml./kg. I.P. of 50-HB-400. Within 20 minutes after injection, the respiratory rate had increased to 24 per minute. This dose would have resulted in convulsions and death had not the animal been treated with pentobarbital. In several subsequent dogs studied a characteristic pattern of effect was demonstrated:

1. doses less than 50 mg./kg. exaggerated the acetylcholine depressor response (anticholinesterase action\*), lowered the blood pressure, reduced the pressor response to bilateral carotid occlusion, and stimulated respiration.
2. higher doses (100-300 mg./kg.) possessed similar but more exaggerated effects, however, in addition, the pressor response to injected epinephrine was reduced; and, on occasion, reversed entirely.

\* in one dog studied, a temporary inhibition of RBC cholinesterase was determined - 50 mg./kg. caused a 30% inhibition, levels were normal at 2 hours. - 100 mg./kg. caused a 45% inhibition, levels were normal at 2 hours.

~ 500 mg/kg.  
the high dose  
low LOC - see guidance

UCON 50-HB-5100 in doses as high as 750 mg./kg. did not possess these effects.

Thus, it appears that active convulsant UCONS possess a dual mechanism of action--adrenergic blockade (direct medullary stimulation has been demonstrated for many adrenergic blocking agents) and central anticholinesterase activity. The latter effect could conceivably augment the direct stimulatory effect of the UCON, however, atropine therapy would not eliminate this direct effect which is probably the more important constituent of the convulsant action.

Morton E. Goldberg  
Morton E. Goldberg, Sc.D.  
Fellow

Herbert E. Johnson  
Herbert E. Johnson, B.A.  
Research Associate

Charles P. Carpenter  
Charles P. Carpenter, Ph.D.  
Assistant Administrative Fellow

Approved:

Typed: May 28, 1962 - md



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

William C. Kuryla, Ph.D.  
Associate Director, Product Safety  
Union Carbide Corporation  
39 Old Ridgebury Road  
Danbury, Connecticut 06817-0001

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

APR 18 1995

EPA acknowledges the receipt of information submitted by your organization under Section 8(e) of the Toxic Substances Control Act (TSCA). For your reference, copies of the first page(s) of your submission(s) are enclosed and display the TSCA §8(e) Document Control Number (e.g., 8EHQ-00-0000) assigned by EPA to your submission(s). Please cite the assigned 8(e) number when submitting follow-up or supplemental information and refer to the reverse side of this page for "EPA Information Requests".

All TSCA 8(e) submissions are placed in the public files unless confidentiality is claimed according to the procedures outlined in Part X of EPA's TSCA §8(e) policy statement (43 FR 11110, March 16, 1978). Confidential submissions received pursuant to the TSCA §8(e) Compliance Audit Program (CAP) should already contain information supporting confidentiality claims. This information is required and should be submitted if not done so previously. To substantiate claims, submit responses to the questions in the enclosure "Support Information for Confidentiality Claims". This same enclosure is used to support confidentiality claims for non-CAP submissions.

Please address any further correspondence with the Agency related to this TSCA 8(e) submission to:

Document Processing Center (7407)  
Attn: TSCA Section 8(e) Coordinator  
Office of Pollution Prevention and Toxics  
U.S. Environmental Protection Agency  
Washington, D.C. 20460-0001

EPA looks forward to continued cooperation with your organization in its ongoing efforts to evaluate and manage potential risks posed by chemicals to health and the environment.

Sincerely,

*Terry R. O'Bryan*  
Terry R. O'Bryan  
Risk Analysis Branch

Enclosure

12122A



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**Triage of 8(e) Submissions**

Date sent to triage: APR 20 1995

NON-CAP

CAP

Submission number: 12122A

TSCA Inventory:

Y

N

D

Study type (circle appropriate):

Group 1 - Dick Clements (1 copy total)

ECO

AQUATO

Group 2 - Ernie Falke (1 copy total)

ATOX

SBTOX

SEN

w/NEUR

Group 3 - Elizabeth Margosches (1 copy each)

STOX

CTOX

EPI

RTOX

GTOX

STOX/ONCO

CTOX/ONCO

IMMUNO

CYTO

NEUR

Other (FATE, EXPO, MET, etc.): \_\_\_\_\_

Notes:

**THIS IS THE ORIGINAL 8(e) SUBMISSION; PLEASE REFILE AFTER TRIAGE DATABASE ENTRY**

**For Contractor Use Only**

entire document: 0

1

2

pages 12

pages 1, 2, 3

Notes:

Contractor reviewer: POE

Date: 4/3/95

CECATS TRIAGE TRACKING DBASE ENTRY FORM

CECATS DATA: Submission # SEHO-0992-12122 SEQ. # 9  
 TYPE INT. SUPP FLWP  
 SUBMITTER NAME Union Carbide Corporation

INFORMATION REQUESTED: FLWP DATE: \_\_\_\_\_  
 0501 NO INFO REQUESTED  
 0502 INFO REQUESTED (TECH)  
 0503 INFO REQUESTED (VOL ACTIONS)  
 0504 INFO REQUESTED (REPORTING RATIONALE)  
 DISPOSITION: (639) REFER TO CHEMICAL SCREENING  
(678) CAP NOTICE

OPTIONARY ACTIONS:  
 0401 NO ACTION REQUIRED  
 0402 STUDIES PLANNED/IN PROGRESS  
 0403 NOTIFICATION OF WORKER AVAILABLE  
 0404 LABELING/MSDS CHANGE  
 0405 PROCESSING/CHANGING  
 0406 APP/USE DISCONTINUED  
 0407 PRODUCTION DISCONTINUED  
 0408 CONFIDENTIAL

SUB. DATE: 08/27/92 OIS DATE: 09/01/92 CSRAD DATE: 02/15/95  
 CHEMICAL NAME: UCON 50-HB-400  
UCON 50-HB-55  
UCON 50-11B-260

UCON 50-HB-5100 unknown

CAS# 9038-95-3  
Unknown

INFORMATION TYPE:	P F C	INFORMATION TYPE:	P F C	INFORMATION TYPE:	P F C
0201 ONCO (HUMAN)	01 02 04	EPICLIN	01 02 04	0241 IMMUNO (ANIMAL)	01 02 04
0202 ONCO (ANIMAL)	01 02 04	HUMAN EXPOS (PROD CONTAM)	01 02 04	0242 IMMUNO (HUMAN)	01 02 04
0203 CELL TRANS (IN VITRO)	01 02 04	HUMAN EXPOS (ACCIDENTAL)	01 02 04	0243 CHEM/PHYS PROP	01 02 04
0204 MUTA (IN VITRO)	01 02 04	HUMAN EXPOS (MONITORING)	01 02 04	0244 CLASTO (IN VITRO)	01 02 04
0205 MUTA (IN VIVO)	01 02 04	ECO/AQUA TOX	01 02 04	0245 CLASTO (ANIMAL)	01 02 04
0206 REPRO/TERATO (HUMAN)	01 02 04	ENV. OCCURRENCE/FATE	01 02 04	0246 CLASTO (HUMAN)	01 02 04
0207 REPRO/TERATO (ANIMAL)	01 02 04	EMER INCI OF ENV CONTAM	01 02 04	0247 DNA DAM/REPAIR	01 02 04
0208 NEURO (HUMAN)	01 02 04	RESPONSE REQEST DELAY	01 02 04	0248 PROD/USE/PROC	01 02 04
0209 NEURO (ANIMAL)	01 02 04	PROD/COMP/CHEM ID	01 02 04	0251 MSDS	01 02 04
0210 ACUTE TOX. (HUMAN)	01 02 04	REPORTING RATIONALE	01 02 04	0299 OTHER	01 02 04
0211 CHR. TOX. (HUMAN)	01 02 04	CONFIDENTIAL	01 02 04		
0212 ACUTE TOX. (ANIMAL)	01 02 04	ALLERG (HUMAN)	01 02 04		
0213 SUB ACUTE TOX (ANIMAL)	01 02 04	ALLERG (ANIMAL)	01 02 04		
0214 SUB CHRONIC TOX (ANIMAL)	01 02 04	METAB/PHARMACO (ANIMAL)	01 02 04		
0215 CHRONIC TOX (ANIMAL)	01 02 04	METAB/PHARMACO (HUMAN)	01 02 04		

TRIAGE DATA: NON-CBI INVENTORY YES Ongoing REVIEW YES (DROP/REFER) NO (CONTINUE) REF:R  
 CAS SR NO IN PRIMING REF:R

SPECIES: Rat mus Frog Dog  
 TOXICOLOGICAL CONCERN: LOW HIGH

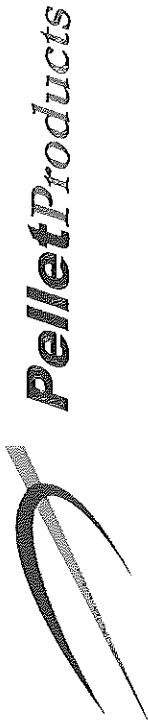
Union Carbide - 1086-0635

No LOC assigned for i.p. route

8(E)-12122A

NO LOC WAS ASSIGNED TO THIS INTRAPERITONEAL STUDY

A LEVEL OF CONCERN WAS NOT ASSIGNED FOR ACUTE TOXICITY OF UCON 50-HB-400 BY THE INTRAPERITONEAL ROUTE IN DOGS. DOSAGES (INTRAPERITONEAL/ANESTHETIZED SUBJECT) LESS THAN 50 MG/KG EXAGGERATED THE ACETYLCHOLINE DEPRESSOR RESPONSE, LOWERED BLOOD PRESSURE, AND STIMULATED RESPIRATION. DOSES FROM 100 TO 300 MG/KG POSSESSED SIMILAR BUT MORE EXAGGERATED EFFECTS. IN ADDITION, AT THIS DOSE LEVEL THE PRESSOR RESPONSE TO INJECTED EPINEPHRINE WAS REDUCED, AND, ON OCCASION, REVERSED ENTIRELY. IN ONE DOG STUDIED, A TEMPORARY INHIBITION OF RBC CHOLINESTERASE WAS DETERMINED, 50 MG/KG CAUSED A 30% INHIBITION WITH NORMAL LEVELS AT 2 HOURS. 100 MG/KG CAUSED A 45% INHIBITION WITH NORMAL LEVELS AT 2 HOURS. IN A COMPANION STUDY WITH THE SUBJECT COMPOUND AND RELATED COMPOUNDS, POSITIVE EFFECTS WERE SEEN WITH HB-55, -260, AND -400 IN RATS AND MICE AND NEGATIVE EFFECTS SEEN WITH HB-5100 IN FEMALE MICE AND RATS. THE MINIMAL ACTIVE DOSE IN BOTH SPECIES FOR THESE COMPOUNDS WAS 0.5 ML/KG ADMINISTERED INTRAPERITONEALLY OVER A WIDE RANGE OF CONCENTRATIONS. TREMORS WERE OBSERVED AT LOWER DOSES. MORTALITY WAS NOT INDICATED. ALL FOUR COMPOUNDS WERE TESTED FOR THEIR ABILITY TO INDUCE CONVULSIVE SEIZURE AFTER ORAL ADMINISTRATION TO RATS. LETHAL DOSES WERE GIVEN TO GROUPS OF 5 ANIMALS. THOSE ANIMALS TREATED WITH HB-55, 260, AND 400 SHOWED EXCITATION OR WELL DEFINED CONVULSIONS PRECEDING DEATH. NO DOSAGES WERE INDICATED FOR THESE GROUPS. ANIMALS TREATED WITH HB-5100 IN DOSES AS HIGH AS 64 ML/KG SHOWED NO CONVULSIONS OR ANY DEGREE OF C.N.S. STIMULATION. NO STUDIES WERE DONE WITH LOWER ORAL DOSES.



# EcoBlend FG®

<b>Ingredients:</b>	
Water	
Polyalkylene glycol monobutyl ether(Boiler Water Additive for use in steam production)	
<b>Health Hazard Data</b>	
<b>FIRST AID</b>	
Eye contact	May cause inflammation and irritation. Flush eyes with water at least 15 minutes, consult physician.
Skin contact	Prolonged exposure may cause dry or chafed skin. Flush with water at least 15 minutes.
Ingestion	May cause stomach upset. Consult a physician.
Inhalation	Continuous exposure may cause lung irritation. Handle in well ventilated area. Remove to fresh air.
Emergency First Aid	Whenever first aid is required, it should be given immediately. Prompt treatment may greatly decrease the severity of the effect.
<b>SPECIAL PROTECTION INFORMATION</b>	
Eye Protection	Goggles recommended
Respiratory Information	Avoid prolonged exposure.
Skin Protection	Rubber gloves recommended
Ventilation Recommended	Local exhaust recommended.

<b>DIRECTIONS FOR USE</b>
EcoBlend FG® is approved as a secondary direct additive to reduce, retard or prevent mineral scaling within the steam boiler. EcoBlend FG® has approval under 21 (CFR) Part 173.310(c) as acceptable materials for addition to boiler water steam lines used in the production of animal feed. EcoBlend FG® is compatible with other boiler water additives produced by Power Chemicals, Inc.
EcoBlend FG® Is to be added directly to the steam boiler system at a use rate of 1-3.5 fluid oz. per ton of feed produced.
<b>STORAGE &amp; DISPOSAL</b>
Store in a warm, dry place above 35°F. Keep container closed when not in use. Dispose in accordance with federal, state and local regulations.
<b>SEE MSDS FOR DETAILED INFORMATION</b>
Lot # _____
Distributed by: <b>Pellet Products, Inc. 2901 S. Kansas Wichita, KS 67216 316-219-0298</b> Net Contents: 275 Gallons ( 1042.25 L)

Table 20 Environmental Effects of Polyalkylene Glycols

Type of molecule	Oxide	Molecular weight	Sturm biodegradation (% biodegradation in 28 days)	Concentrations (mg/L)		
				96-hour fathead minnow acute toxicity, LC <sub>50</sub> <sup>a</sup>	48-hour <i>Daphnia magna</i> acute toxicity, EC <sub>50</sub> <sup>a</sup>	Bacterial inhibition IC <sub>50</sub> <sup>a</sup>
Monobutyl ether	100% PO	340	84	190	450	2,800
		740	99	86	250	1,300
		1,020	85	37	69	34,000
		1,550	48	20	26	19,000
		2,490	23	180	520	>50,000
Monobutyl ether	50:50 EO/PO	520	93	3,200	4,300	18,500
		970	65	13,000	5,400	40,000
		1,700	45	24,500	21,000	32,000
		3,930	7	11,900	17,000	10,000
		2,470	71	129,000	88,000	38,000
Diol	75:25 <sup>b</sup> EO/PO	12,000	8	65,000	83,000	94,000
			57	6,700	1,400	36,000
Water/glycol hydraulic fluid concentrate			64	4,500	4,800	22,000
Water/glycol hydraulic fluid						

<sup>a</sup>LC<sub>50</sub> = median lethal concentration (expected 50% mortality), EC<sub>50</sub> = median effect concentration (expected 50% loss of mobility); IC<sub>50</sub> = median inhibition concentration (expected 50% loss of respiration).



# Material Safety Data Sheet

The Dow Chemical Company

Product Name: UCON(TM) LUBRICANT 50-HB-3520

Issue Date: 07/06/2011

Print Date: 21 May 2012

The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

## 1. Product and Company Identification

Product Name  
UCON™ LUBRICANT 50-HB-3520

### COMPANY IDENTIFICATION

The Dow Chemical Company  
2030 Willard H. Dow Center  
Midland, MI 48674  
United States

Customer Information Number: 800-258-2436  
[SDSQuestion@dow.com](mailto:SDSQuestion@dow.com)

### EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 989-636-4400  
Local Emergency Contact: 989-636-4400

## 2. Hazards Identification

### Emergency Overview

Color: Colorless to yellow

Physical State: Liquid.

Odor: Mild

### Hazards of product:

**DANGER!** Exposure to concentrations of mist/aerosol may cause lung damage and death. Keep upwind of spill.

### Potential Health Effects

**Eye Contact:** Essentially nonirritating to eyes. Corneal injury is unlikely.

**Skin Contact:** Prolonged contact may cause slight skin irritation with local redness.

**Skin Absorption:** Prolonged skin contact is unlikely to result in absorption of harmful amounts.

**Inhalation:** At room temperature, exposure to vapor is minimal due to low volatility. Prolonged exposure to aerosol/mist may cause serious adverse effects, even death.

**Ingestion:** Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.



**Aspiration hazard:** Based on physical properties, not likely to be an aspiration hazard.

**Effects of Repeated Exposure:** Exposure to high concentrations of mist/aerosol may be associated with delayed lung damage.

### 3. Composition Information

Component	CAS #	Amount
Polyalkylene glycol monobutyl ether	9038-95-3	> 35.0 - < 45.0 %
Polyalkylene glycol monobutyl ether	9038-95-3	> 55.0 - < 65.0 %

### 4. First-aid measures

#### Description of first aid measures

**General advice:** First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

**Inhalation:** Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

**Skin Contact:** Wash skin with plenty of water.

**Eye Contact:** Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

**Ingestion:** No emergency medical treatment necessary.

#### Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

#### Indication of immediate medical attention and special treatment needed

Maintain adequate ventilation and oxygenation of the patient. Exposure to high concentrations of mist/aerosol may be associated with delayed lung damage. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

### 5. Fire Fighting Measures

#### Suitable extinguishing media

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

**Extinguishing Media to Avoid:** Do not use direct water stream. May spread fire.

#### Special hazards arising from the substance or mixture

**Hazardous Combustion Products:** During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

**Unusual Fire and Explosion Hazards:** Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

#### Advice for firefighters

**Fire Fighting Procedures:** Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound

from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage.

**Special Protective Equipment for Firefighters:** Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

## 6. Accidental Release Measures

**Personal precautions, protective equipment and emergency procedures:** Refer to Section 7, Handling, for additional precautionary measures. Keep upwind of spill. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

**Environmental precautions:** Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

**Methods and materials for containment and cleaning up:** Contain spilled material if possible. Collect in suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

## 7. Handling and Storage

### Handling

**General Handling:** Do not breathe mist. Use only with adequate ventilation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

**Other Precautions:** Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

### Storage

Store in the following material(s): 316 stainless steel. Carbon steel. Glass-lined container. Polypropylene. Polyethylene-lined container. Stainless steel. Teflon. This material may soften and lift certain paint and surface coatings. Use product promptly after opening. Store in original unopened container. Unopened containers of material stored beyond the recommended shelf life should be retested against the sales specifications before use. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact.

**Shelf life: Use within**  
24 Months

## 8. Exposure Controls / Personal Protection

### Exposure Limits

None established

### Personal Protection

**Eye/Face Protection:** Use safety glasses (with side shields).

**Skin Protection:** Wear clean, body-covering clothing.

**Hand protection:** Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Natural rubber ("latex"). Neoprene. Polyvinyl chloride ("PVC" or "vinyl"). Nitrile/butadiene rubber ("nitrile" or "NBR"). Viton. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take

into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

**Respiratory Protection:** Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use an approved respirator. Selection of air-purifying or positive-pressure supplied-air will depend on the specific operation and the potential airborne concentration of the material. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

**Ingestion:** Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

#### Engineering Controls

**Ventilation:** Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations.

## 9. Physical and Chemical Properties

Appearance	
Physical State	Liquid.
Color	Colorless to yellow
Odor	Mild
Odor Threshold	No test data available
pH	5.5 - 7.5 <i>ASTM E70</i> (10% dilution in water)
Melting Point	No test data available
Freezing Point	See Pour Point
Boiling Point (760 mmHg)	> 200 °C (> 392 °F) <i>Calculated</i> .
Flash Point - Closed Cup	182 °C (360 °F) <i>ASTM D93</i>
Flash Point - Open Cup	243 °C (469 °F) <i>ASTM D92</i>
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	No
Flammable Limits in Air	Lower: No test data available Upper: No test data available
Vapor Pressure	< 0.01 mmHg @ 20 °C <i>ASTM E1719</i>
Vapor Density (air = 1)	>1 <i>Calculated</i>
Specific Gravity (H <sub>2</sub> O = 1)	1.056 20 °C/20 °C <i>Calculated</i>
Solubility in water (by weight)	100 % <i>Visual</i>
Partition coefficient, n-octanol/water (log Pow)	No data available for this product.
Autoignition Temperature	No test data available
Decomposition Temperature	No test data available
Kinematic Viscosity	662 - 721 cSt @ 40 °C <i>ASTM D445</i>
Explosive properties	no data available
Oxidizing properties	no data available
Molecular Weight	3380 g/mol <i>Calculated</i>
Pour point	-28.9 °C (-20.0 °F) <i>ASTM D97</i>
Volatile Organic Compounds	0.00 g/l <i>EPA Method No. 24</i>

## 10. Stability and Reactivity

### Reactivity

No dangerous reaction known under conditions of normal use.

**Chemical stability**

Thermally stable at recommended temperatures and pressures.

**Possibility of hazardous reactions**

Polymerization will not occur.

**Conditions to Avoid:** Exposure to elevated temperatures can cause product to decompose.

Generation of gas during decomposition can cause pressure in closed systems.

**Incompatible Materials:** Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

**Hazardous decomposition products**

Decomposition products depend upon temperature, air supply and the presence of other materials.

Decomposition products can include and are not limited to: Aldehydes. Alcohols. Ethers.

Hydrocarbons. Ketones. Organic acids. Polymer fragments.

## 11. Toxicological Information

**Acute Toxicity****Ingestion**

LD50, Rat > 40,550 mg/kg

**Dermal**

LD50, Rabbit > 20,000 mg/kg

**Inhalation**

As product: The LC50 has not been determined.

**Eye damage/eye irritation**

Essentially nonirritating to eyes. Corneal injury is unlikely.

**Skin corrosion/irritation**

Prolonged contact may cause slight skin irritation with local redness.

**Sensitization****Skin**

No relevant data found.

**Respiratory**

No relevant data found.

**Repeated Dose Toxicity**

Exposure to high concentrations of mist/aerosol may be associated with delayed lung damage.

**Chronic Toxicity and Carcinogenicity**

No relevant data found.

**Developmental Toxicity**

No relevant data found.

**Reproductive Toxicity**

No relevant data found.

**Genetic Toxicology**

No relevant data found.

## 12. Ecological Information

**Toxicity****Data for Component: Polyalkylene glycol monobutyl ether**

Based on information for a similar material: Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/L).

**Data for Component: Polyalkylene glycol monobutyl ether**

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 > 100 mg/L in the most sensitive species tested).

**Fish Acute & Prolonged Toxicity**

LC50, fathead minnow (*Pimephales promelas*), static, 96 h: 3,170 - 11,900 mg/l  
**Aquatic Invertebrate Acute Toxicity**  
 EC50, water flea *Daphnia magna*, static, 48 h, immobilization: 17,000 - 19,000 mg/l  
**Toxicity to Micro-organisms**  
 EC50; bacteria, static, 16 h: 10,000 mg/l

### Persistence and Degradability

#### Data for Component: Polyalkylene glycol monobutyl ether

Based on information for a similar material: Polyglycols with a molecular weight of > 2000 are not expected to be readily biodegradable. Material is inherently biodegradable (reaches > 20% biodegradation in OECD test(s) for inherent biodegradability).

#### Data for Component: Polyalkylene glycol monobutyl ether

Biodegradation under aerobic static laboratory conditions is moderate (BOD20 or BOD28/ThOD between 10 and 40%).

#### OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method	10 Day Window
7 %	28 d	OECD 301B Test	fail

#### Biological oxygen demand (BOD):

BOD 5	BOD 10	BOD 20	BOD 28
6.000 %	13.000 %	24.000 %	

Chemical Oxygen Demand: 1.90 mg/mg

### Bioaccumulative potential

#### Data for Component: Polyalkylene glycol monobutyl ether

**Bioaccumulation:** No bioconcentration is expected because of the relatively high molecular weight (MW greater than 1000).

#### Data for Component: Polyalkylene glycol monobutyl ether

**Bioaccumulation:** No bioconcentration is expected because of the relatively high molecular weight (MW greater than 1000).

### Mobility in soil

#### Data for Component: Polyalkylene glycol monobutyl ether

**Mobility in soil:** No data available.

#### Data for Component: Polyalkylene glycol monobutyl ether

**Mobility in soil:** No data available.

## 13. Disposal Considerations

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device.

## 14. Transport Information

**DOT Non-Bulk**  
NOT REGULATED

**DOT Bulk**  
NOT REGULATED

**IMDG**  
NOT REGULATED

**ICAO/IATA**  
NOT REGULATED

*This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.*

## 15. Regulatory Information

### Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

### Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

### Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

### Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

### US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A)

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

### California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

### US. Toxic Substances Control Act

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

### European Inventory of Existing Commercial Chemical Substances (EINECS)

This product is a polymer according to the definition in Directive 92/32/EEC (7<sup>th</sup> Amendment to Directive 67/548/EEC) and all of its starting materials and intentional additives are listed in the

European Inventory of Existing Commercial Chemical Substances (EINECS) or in compliance with European (EU) chemical inventory requirements.

**CEPA - Domestic Substances List (DSL)**

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

## 16. Other Information

### Hazard Rating System

NFPA	Health	Fire	Reactivity
	1	1	0

### Recommended Uses and Restrictions

Selection of the appropriate polyglycol product for a specific application requires knowledge of the fluid requirements of the application, awareness of the most important of these requirements, and a match-up with the properties of the various polyglycol materials. Polyglycol products can be formulated for use in numerous industry applications such as hydraulic fluids, quenchant, compressor and refrigeration lubricants, heat transfer fluids, machinery lubricants, solder assist fluids, metalworking lubricants, textile finishing, etc. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

### Revision

Identification Number: 2243 / 1001 / Issue Date 07/06/2011 / Version: 7.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

### Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

*The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.*



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## Product Safety Assessment

*UCON™ 50-HB Lubricants (High Molecular Weight)*

*UCON™ Lubricants 50-HB-660, -2000, -3520, -5100*

Product Safety Assessment documents are available at: [www.dow.com/productsafety/finder/](http://www.dow.com/productsafety/finder/).

### Select a Topic:

[Names](#)

[Product Overview](#)

[Manufacture of Product](#)

[Product Description](#)

[Product Uses](#)

[Exposure Potential](#)

[Health Information](#)

[Environmental Information](#)

[Physical Hazard Information](#)

[Regulatory Information](#)

[Additional Information](#)

[References](#)

### Names

- CAS No. 9038-95-3
- Polyalkylene glycol monobutyl ether
- PAGMBE
- Propylene oxide ethylene oxide polymer monobutyl ether
- UCON™ Lubricant 50-HB-660
- UCON™ Lubricant 50-HB-2000
- UCON™ Lubricant 50-HB-3520
- UCON™ Lubricant 50-HB-5100

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### Product Overview

- The information in this document is valid for higher molecular weight UCON™ 50-HB lubricants, as listed in the [Names](#) section. UCON 50-HB lubricants are polyalkylene glycol monobutyl ether polymers. They are colorless to yellow liquids with a mild odor. The solubility of UCON 50-HB lubricants in water changes with temperature. UCON 50-HB lubricants have the unusual property of complete solubility (dissolving easily) in cold water; however, they become insoluble at temperatures greater than 40°C (104°F).<sup>1,2</sup> For further details, see [Product Description](#).
- UCON 50-HB lubricants are used a variety of applications, including but not limited to: textile-fiber manufacturing lubricant; chemical intermediate; foam control agent; anti-stick, coating agent for the rubber industry; and base polymers for the formulation of specialized lubricants. UCON™ 50-HB lubricants are also used in skin- and hair-care formulations as emollients (softening agents) and solvents.<sup>3,4</sup> For further details, see [Product Uses](#).
- Worker exposure to UCON 50-HB lubricants is possible during manufacturing or industrial use.<sup>5</sup> Because these materials can be used in personal care products, consumer exposure is also possible. For further details, see [Exposure Potential](#).
- Eye contact with the higher molecular weight UCON 50-HB lubricants is essentially non-irritating. Although brief skin contact is nonirritating, prolonged skin contact may cause slight irritation with local redness. Prolonged skin contact is not likely to result in absorption of harmful amounts. These materials have low volatility at room temperature. Prolonged inhalation of heated material or mist may cause serious adverse effects, even death.<sup>6</sup> For further details, see [Health Information](#).

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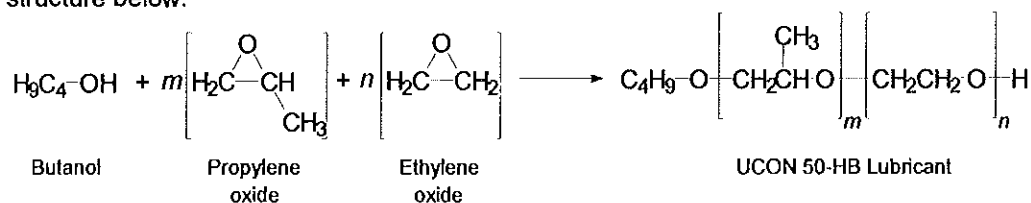


- UCON™ 50-HB lubricants are moderately biodegradable and are not expected to accumulate in the food chain. These materials are practically non-toxic to fish and other aquatic organisms on an acute basis.<sup>7</sup> For further details, see [Environmental Information](#).
- UCON 50-HB lubricants are thermally stable at recommended temperatures. Avoid contact with strong acids, strong bases, and strong oxidizers.<sup>8</sup> For further details, see [Physical Hazard Information](#).

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### Manufacture of Product

- **Locations** – UCON™ 50-HB lubricants are manufactured by Dow at their facility in South Charleston, West Virginia (USA).
- **Process** – UCON 50-HB lubricants are produced by reacting an equal amount by weight of ethylene oxide and propylene oxide with butyl alcohol using an alkali catalyst at temperatures from 100 to 150°C. The result is a random copolymer with the general structure below:



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### Product Description<sup>9,10,11</sup>

UCON™ 50-HB lubricants are colorless to yellow liquids with a mild odor and low volatility (do not evaporate easily at room temperature). They are water soluble at temperatures below 40°C (104°F). UCON 50-HB lubricants are very high purity (>99%) synthetic polymers made from polyalkylene glycol monobutyl ether (PAGMBE). Individual products vary in their average molecular weight and viscosity. Viscosity is the measure of a liquid's resistance to flow. Lubricants are named according to their Saybolt viscosity value. For example, product UCON 50-HB-3520 has a viscosity of 3520 Saybolt universal seconds (SUS) at 100°F (37.8°C).

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### Product Uses<sup>12,13,14</sup>

UCON™ high molecular weight 50-HB lubricants can be used for a variety of applications, including but not limited to:

- **Chemical intermediates** – for the manufacture of resins, plasticizers, modifiers, and surfactants
- **Compressor lubricants** – as base fluids in compressor lubricant formulations
- **Antifoam agents** – in boiler water and fermentation processes
- **Personal-care products** – as an emollient (softening agent), solvent or viscosity modifier for moisturizing body lotions, self tanning products, eye-make-up remover formulations, skin toner, and hair treatment / shampoo formulations
- **Rubber lubricants** – as anti-stick agents for uncured rubber, machining lubricants for hard rubber, mold lubricants, and lubricants for rubber packings, o-rings, and seals
- **Textile-fiber lubricants** – for high-speed, high-temperature, synthetic-fiber manufacturing processes such as false-twist texturing. High molecular weight UCON 50-HB lubricants are

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friction-resistant, do not discolor or stain fabrics, and can be removed in conventional scouring processes.

UCON™ 50-HB-660, 50-HB-2000, 50-HB-3520, and 50-HB-5100 lubricants comply with U.S. Food and Drug Administration (FDA) Regulation 21 CFR sections: 173.310, 173.340, 175.105, 176.210(d)(3), 178.3120, 178.3570, and 178.3910, meaning they are permitted for use in direct or indirect food contact applications.

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### Exposure Potential<sup>15</sup>

UCON™ 50-HB high molecular weight lubricants are used for industrial and consumer applications. Based on these uses, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a polyalkylene glycol monobutyl ether manufacturing facility or in the various industrial or manufacturing facilities that use these lubricants. Those working with these materials in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each facility that manufactures or uses this material should have a thorough training program for employees and appropriate work processes and safety equipment in place. For more information, see [Health Information](#).
- **Consumer exposure to products containing UCON 50-HB lubricants** – Because these lubricants can be used in personal-care products such as lotions, self-tanning products, moisturizers, eye-make-up remover, and hair treatment/shampoos, it is possible for consumers to come in contact with them. Always read the product information before use and follow the label/use instructions. For more information, see [Health Information](#).
- **Environmental releases** – Due to their low volatility and high water solubility, UCON 50-HB lubricants released into the environment will tend to remain in water. Because these products are moderately biodegradable, they are expected to be removed by sewage treatment plants. In the event of a spill, the focus is to prevent the material from entering into soil, ditches, sewers, waterways, or groundwater. See [Environmental, Health and Physical Hazard Information](#).
- **Large releases** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, dike the area to contain the spill. The material should be collected in suitable and properly labeled containers, and reprocessed or disposed of properly. Use appropriate safety equipment.
- **In case of fire** – Keep people away. Isolate area and deny any unnecessary entry. Personnel involved in fire fighting should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective fire-fighting clothing or fight fire from a safe distance. Use water fog or fine water spray. Do not use a direct water stream, it may spread the fire. Alcohol-resistant foam (ATC Type) extinguishers are preferred, along with dry-chemical or carbon-dioxide extinguishers. See [Environmental, Health and Physical Hazard Information](#).

For more information, review the relevant [Safety Data Sheet](#).

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### Health Information<sup>16</sup>

**Eye contact** – Eye contact with the higher molecular weight UCON™ 50-HB lubricants is essentially nonirritating. Corneal injury is unlikely.

**Skin contact** – Prolonged skin contact may cause slight irritation with local redness, but is unlikely to result in absorption of harmful amounts.

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**Inhalation** – The higher molecular weight UCON™ 50-HB lubricants are harmful if inhaled. At room temperature, exposure to vapor is unlikely due to low volatility (i.e. these products do not evaporate easily). Prolonged exposure aerosol/mist may cause serious adverse effects, even death.

**Ingestion** – Higher molecular weight UCON 50-HB lubricants have low toxicity if swallowed. Harmful effects are not anticipated from swallowing small amounts.

**Effects of Repeated exposure** – Exposure to high concentrations of aerosol/mist may be associated with delayed lung damage. In multiple studies with different molecular weight UCON™ 50-HB fluids, there were no significant adverse effects in laboratory animals associated with 2-years of daily dietary exposure.

For more information, see the relevant [Safety Data Sheet](#).

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### **Environmental Information<sup>17</sup>**

UCON™ 50-HB lubricants have low volatility (do not evaporate easily). Because they are water soluble at room temperature, these lubricants will have the tendency to remain in water with minimal tendency to bind to soil or sediment.

UCON 50-HB lubricants are unlikely to persist in the environment. These compounds are moderately biodegradable which suggests they will be removed from water and soil environments, including biological waste water treatment plants.

UCON 50-HB lubricants are not likely to accumulate in the food chain (their bioconcentration potential is low) and they are practically nontoxic to fish and other aquatic organisms on an acute basis.

For more information, see the relevant [Safety Data Sheet](#).

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### **Physical Hazard Information<sup>18</sup>**

Higher molecular weight UCON™ 50-HB lubricants are thermally stable at recommended temperatures and pressures. Exposure to elevated temperatures can cause these products to decompose. Generation of gas during decomposition can cause pressure in closed systems. Decomposition products depend on temperature, air supply, and the presence of other materials and can include aldehydes, alcohols, ethers, hydrocarbons, ketones, organic acids, and polymer fragments. UCON 50-HB lubricants are incompatible with strong acids, strong bases, and strong oxidizers. Contact should be avoided.

For more information, see the relevant [Safety Data Sheet](#).

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### **Regulatory Information**

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of UCON™ 50-HB lubricants. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant [Safety Data Sheet](#) or [Contact Us](#).

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## Additional Information

- Safety Data Sheets (<http://www.dow.com/webapps/msds/msdssearch.aspx>)
- Contact Us (<http://www.dow.com/ucon/contact/>).
- UCON™ Fluids and Lubricants website: (<http://www.dow.com/ucon/index.htm>)
- Dow Customer Information Group (<http://www.dow.com/assistance/dowcig.htm>) or 1-800-258-2436 or 1-989-832-1556 (U.S.) or 1-800-331-6451 (Canada)
- *Pulmonary Toxicity of Polyalkylene Glycols, Technical Report No. 55*, European Center for Ecotoxicology and Toxicology of Chemicals (ECETOC), ISSN-0773-8072-55, Brussels, Belgium, 1997
- *UCON™ Fluids and Lubricants*, The Dow Chemical Company, Form No. 118-01346-1101 AMS, November 2001  
([http://www.dow.com/PublishedLiterature/dh\\_003a/0901b8038003a7af.pdf?filepath=/ucon/pdfs/noreg/118-01346.pdf&fromPage=GetDoc](http://www.dow.com/PublishedLiterature/dh_003a/0901b8038003a7af.pdf?filepath=/ucon/pdfs/noreg/118-01346.pdf&fromPage=GetDoc))
- *Guide to Selecting UCON™ Fluids and Lubricants Including Properties, Applications and Features*, The Dow Chemical Company, Form No. 118-01576-505 AMS, May 2005  
([http://www.dow.com/PublishedLiterature/dh\\_005a/0901b8038005ab27.pdf?filepath=/ucon/pdfs/noreg/118-01576.pdf&fromPage=GetDoc](http://www.dow.com/PublishedLiterature/dh_005a/0901b8038005ab27.pdf?filepath=/ucon/pdfs/noreg/118-01576.pdf&fromPage=GetDoc))
- *UCON™ Base Stocks*, The Dow Chemical Company, Form No. 118-01578-1005 AMS, October 2005  
([http://www.dow.com/PublishedLiterature/dh\\_004d/0901b8038004d7ac.pdf?filepath=/ucon/pdfs/noreg/118-01578.pdf&fromPage=GetDoc](http://www.dow.com/PublishedLiterature/dh_004d/0901b8038004d7ac.pdf?filepath=/ucon/pdfs/noreg/118-01578.pdf&fromPage=GetDoc))
- *UCON™ Fluids and Lubricants: UCON Antifoams Technical Data Sheet*, The Dow Chemical Company, Form No. 118-01307-0604 rlr, June 2004  
([http://www.dow.com/PublishedLiterature/dh\\_0030/0901b803800302c3.pdf?filepath=/ucon/pdfs/noreg/118-01307.pdf&fromPage=GetDoc](http://www.dow.com/PublishedLiterature/dh_0030/0901b803800302c3.pdf?filepath=/ucon/pdfs/noreg/118-01307.pdf&fromPage=GetDoc))
- *UCON™ Fluids: Unique Formulation Additives that Deliver Emolliency, Solvency, and Smooth Application*, Amerchol Corporation (a subsidiary of The Dow Chemical Company), Form No. 324-00179-0305 AMS, March 2005  
([http://www.dow.com/PublishedLiterature/dh\\_005a/0901b8038005a38b.pdf?filepath=amerchol/pdfs/noreg/324-00179.pdf&fromPage=GetDoc](http://www.dow.com/PublishedLiterature/dh_005a/0901b8038005a38b.pdf?filepath=amerchol/pdfs/noreg/324-00179.pdf&fromPage=GetDoc))

For more business information about UCON™ 50-HB lubricants, visit the UCON™ Fluids and Lubricants website at [www.ucon.com](http://www.ucon.com).

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## References

- <sup>1</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, pages 1, 2, and 4.
- <sup>2</sup> *UCON™ Fluids and Lubricants*, The Dow Chemical Company, Form No. 118-01346-1101 AMS, November 2001, pages 2 and 5.
- <sup>3</sup> *UCON™ Fluids and Lubricants*, The Dow Chemical Company, Form No. 118-01346-1101 AMS, November 2001, pages 12, 15 and 17–19.
- <sup>4</sup> Amerchol product: Specialty Products Functional Overview website:  
([http://www.dow.com/ucc/amerchol/overview/sp\\_prod.htm](http://www.dow.com/ucc/amerchol/overview/sp_prod.htm)).
- <sup>5</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, pages 1 and 5.
- <sup>6</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, pages 3–4.
- <sup>7</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, page 4.
- <sup>8</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, page 5.

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- <sup>9</sup> *Pulmonary Toxicity of Polyalkylene Glycols Technical Report No. 55*, European Center for Ecotoxicology and Toxicology of Chemicals (ECETOC), ISSN-0773-8072-55, Brussels, Belgium, 1997, page 3.
- <sup>10</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, pages 1, 2, and 4.
- <sup>11</sup> *UCON™ Fluids: Unique Formulation Additives that Deliver Emolliency, Solvency, and Smooth Application*, Amerchol Corporation (a subsidiary of the Dow Chemical Company), Form No. 324-00179-0305 AMS, March 2005, pages 3 and 4.
- <sup>12</sup> *UCON™ Fluids and Lubricants*, The Dow Chemical Company, Form No. 118-01346-1101 AMS, November 2001, pages 12, 15, 17–19, and 40–41.
- <sup>13</sup> *UCON™ Fluids: Unique Formulation Additives that Deliver Emolliency, Solvency, and Smooth Application*, Amerchol Corporation (a subsidiary of the Dow Chemical Company), Form No. 324-00179-0305 AMS, March 2005, page 18.
- <sup>14</sup> Dow's Amerchol product: Specialty Products Functional Overview website: ([http://www.dow.com/ucc/amerchol/overview/sp\\_prod.htm](http://www.dow.com/ucc/amerchol/overview/sp_prod.htm))
- <sup>15</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, pages 2–4.
- <sup>16</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, pages 1 and 5.
- <sup>17</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, page 5.
- <sup>18</sup> *UCON™ Lubricant 50-HB-3520 Material Safety Data Sheet*, The Dow Chemical Company, April 3, 2009, page 4.

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NOTICES:

As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment is intended to give general information about the chemical (or categories of chemicals) addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

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