Material Safety Data Sheet

IMIQUIMOD CREAM 5%

Manufacturer: Beltapharm S.p.A
Via Stelvio, 66
20095 Cusano Mil. (MI)
Italy.

Section I – IDENTIFICATION:

TRADE NAME/MATERIAL NAME: **Imiquimod Cream 5%**

DESCRIPTION: Imiquimod Cream

CHEMICAL NAME (for active ingredient): 1-(2-methylpropyl)-1H-imidazo[4,5-c]quinolin-4-amine
CHEMICAL FAMILY (for active ingredient): Imidazoquinolines
HOW SUPPLIED: Cream
FORMULA (for active ingredient): $C_{14}H_{16}N_4$
PRODUCT USE: Pharmaceutical for Human Use
SUPPLIER/MANUFACTURER'S NAME: Beltapharm S.p.A
ADDRESS: Via Stelvio, 66, 20095 Cusano Mil. (MI) - Italy

Section II – HAZARDOUS INGREDIENTS/COMPOSITION INFORMATION:

EMERGENCY OVERVIEW: Product Description: This product is an off-white odorless cream. **Health Hazards:** The chief health hazard associated with exposure during normal use and handling is the potential for irritation of contaminated skin. Individuals who have had allergic reactions to products containing the active ingredient, Imiquimod, or any other components of this product may experience allergic reactions to this product. The most common adverse effects have included mild skin irritation, dryness, flaking, scabbing, redness, or hardening of the skin. **Flammability Hazards:** If heated to high temperatures for a prolonged period, the water in this product can evaporate off and the residue may ignite. When involved in a fire, this material may decompose and produce irritating vapors and toxic compounds (including carbon oxides and nitrogen oxides). **Reactivity Hazards:** This product is not reactive. **Environmental Hazards:** This product has not been tested for environmental effects. Large quantities released to the aquatic and terrestrial environment may have an adverse effect.

Emergency Considerations: Emergency responders should wear appropriate protection for situation to which they respond.

COMPOSITION INFORMATION

Chemical Name	CAS #	% w/w
Imiquimod	99011-02-6	5.0 %
Cetyl Alcohol	36653-82-4	Proprietary
Stearyl Alcohol	112-92-5	Proprietary
White Petrolatum	8009-03-8	Proprietary
Polysorbate 60	9005-67-8	Proprietary
Glycerin	56-81-5	Proprietary
Xanthan Gum	11138-66-2	Proprietary
Benzyl Alcohol	100-51-6	Proprietary
Methylparaben	99-76-3	Proprietary
Purified Water and other components	The remaining components do not contribute any significant additional hazards.	Balance

Section III – HEALTH HAZARD DATA:

The chief health hazard associated with exposure during normal use and handling is the potential for irritation of contaminated skin. Individuals who have had allergic reactions to products containing the active ingredient, Imiquimod, or any other components of this product may experience allergic reactions to this product. The most common adverse effects have included mild skin irritation, dryness, flaking, scabbing, redness, or hardening of the skin.

Section IV – FIRST AID MEASURES:

Persons developing hypersensitivity reactions should receive medical attention. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Take a copy of label and MSDS to physician or health professional with the contaminated individual.

SKIN EXPOSURE: If adverse skin effects occur, discontinue use. Seek medical attention.

INHALATION: If vapors of this product are inhaled, causing irritation, remove victim to fresh air. If necessary, use artificial respiration to support vital functions.

EYE EXPOSURE: If this product contaminates the eyes, rinse eyes under gently running water. Use sufficient force to open eyelids and then "roll" eyes while flushing. Minimum flushing is for 20 minutes. The contaminated individual must seek medical attention if any adverse effect continues after rinsing.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If victim is convulsing, maintain an open airway and obtain immediate medical attention.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin conditions may be aggravated by repeated overexposures to this product.

RECOMMENDATIONS TO PHYSICIANS: This product should only be given to patients by persons experienced in management of patients receiving the type of therapy intended for this product. Treat symptoms and eliminate exposure.

Section V – FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: Not established.

AUTOIGNITION TEMPERATURE: Not established.

FLAMMABLE LIMITS (in air by volume, %): Not established.

FIRE EXTINGUISHING MEDIA: Use extinguishing media appropriate for surrounding fire.

UNSUITABLE FIRE EXTINGUISHING MEDIA: None known.

SPECIAL FIRE AND EXPLOSION HAZARDS: If heated to high temperatures for a prolonged period, the water in this product can evaporate off and the residue may ignite. When

involved in a fire, this material may decompose and produce irritating vapors and toxic compounds (including carbon and nitrogen oxides). This product contains potential skin and/or skin sensitizers so presents a contact hazard to firefighters.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

ADVICE TO FIRE-FIGHTERS: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus (SCBA) and full protective equipment. If protective equipment is contaminated by this product, it should be thoroughly washed with running water prior to removal of SCBA respiratory protection. Firefighters whose protective equipment becomes contaminated should thoroughly shower with warm, soapy water and should receive medical evaluation if they experience any adverse effects.

Section VI – ACCIDENTAL RELEASE INFORMATION:

SPILL AND LEAK RESPONSE: Proper protective equipment should be used. In the event of a spill, clear the area and protect people. The atmosphere must have levels of components lower than those listed in Section VIII, (Control Measures and Personal Protective Equipment) if applicable, and have at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus (SCBA).

Small Spills: Wear safety glasses and gloves while wiping up small spills of this product with polypad or sponge.

Large Spills: Trained personnel following pre-planned procedures should handle non-incidental releases. Access to the spill areas should be restricted. Protective apparel should be used with a respirator when there is any danger of mists or sprays being generated. Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit. The dispersal of mists or sprays into surrounding air and the possibility of inhalation is a serious matter and should be treated as such. Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard hat, and Self-Contained Breathing Apparatus. Wipe up spilled material using polypads or other suitable absorbent material. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Monitor area and confirm levels are bellow exposure limits given in Section VIII (Control Measures and Personal Protective Equipment), if applicable, before non-response personnel are allowed into the spill area.

Decontaminate the area of the spill thoroughly using detergent and water. Place all spill residue in an appropriate container and seal. Dispose of in accordance with applicable Federal, State, and local procedures (see Section XIII, Disposal Information).

Section VII – SAFE HANDLING, STORAGE AND USE:

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Do not eat, drink, smoke, or apply cosmetics while handling this product. Wash hands thoroughly after handling this product or equipment and containers that contain this product. Avoid breathing vapors generated by this product. Follow SPECIFIC USE INSTRUCTIONS supplied with this product. Particular care in working with this product must be practiced in pharmacies and other preparation areas, during manufacture of this compound, and during patient administration.

STORAGE AND HANDLING PRACTICES: Employees must be trained to properly use this product. Use of this product should be performed in a designated area for working with drugs. Ensure product is properly labeled. Store this product away from incompatible materials. Store this product in original container. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Empty packages may contain residual liquid or vapors; therefore, empty packages should be handled with care.

PRODUCT PREPARATION INSTRUCTIONS FOR MEDICAL PERSONNEL: Handle this material following standard medical practices and following the recommendations presented on the Package Insert.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: When cleaning non-disposable equipment, wear latex or butyl rubber gloves (double gloving is recommended), goggles, and lab coat. Wash equipment with soap and water. Collect all rinsates and dispose of according to applicable U.S. Federal, State, and local hazardous waste disposal regulations. All disposable items contaminated with this product should be disposed of properly.

Section VIII – CONTROL MEASURES AND PERSONAL PROTECTIVE EQUIPMENT:

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Follow standard medical product handling procedures. During decontamination of work surfaces, workers should wear the same equipment recommended in Section VI (Accidental Release Information) of this MSDS.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132). Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: A respirator is not required for routine conditions of use of this product. If respiratory protection is needed, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

EYE PROTECTION: Not normally needed during normal use. If necessary, refer to U.S. OSHA 29 CFR 1910.133.

HAND PROTECTION: For situations in which prolonged skin contact is anticipated, double glove, using latex, nitrile, or rubber gloves. Check gloves for leaks. Wash hands before putting on gloves and after removing gloves. Gloves should cover the gown cuff. If necessary, refer to U.S. OSHA 29 CFR 1910.138.

BODY PROTECTION: During patient administration, use of lightweight cotton gown or other medical attire is recommended. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136, Protective Footwear.

Section IX – PHYSICAL/CHEMICAL CHARACTERISTICS:

BOILING POINT: Not established.

FREEZING/MELTING POINT: Not established.

EVAPORATION RATE (nBuAc = 1): Not established.

SOLUBILITY IN WATER: Slightly soluble.

VAPOR PRESSURE (air = 1): Not established.

SPECIFIC GRAVITY (water = 1): Not established.

ODOR THRESHOLD: Not established.

pH: Not established.

COEFFICIENT WATER/OIL DISTRIBUTION: Not established.

APPEARANCE AND COLOR: This product is an off-white cream.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance of this product is a distinguishing characteristic to identify the product in event of accidental release.

Section X – STABILITY AND REACTIVITY DATA:

REACTIVITY/CHEMICAL STABILITY: This product is stable.

DECOMPOSITION PRODUCTS: Combustion: If exposed to extremely high temperatures, thermal decomposition may generate irritating fumes and toxic gases (e.g., carbon and nitrogen oxides). Hydrolysis: None known.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is generally compatible with other common materials in a medical facility. Acids, caustics, and other chemicals that could affect its performance should be avoided.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid heat, light, and contact with incompatible chemicals.

Section XI – TOXICOLOGICAL INFORMATION:

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The health hazard information provided below is pertinent to medical employees handling this product in an occupational setting. This product is designed for application on the skin. The following paragraphs describe the symptoms of exposure by route of exposure.

INHALATION: Although unlikely due to form of product, inhalation of vapors of this product may slightly irritate the nose, throat, and lungs. Symptoms are generally alleviated upon breathing fresh air. Due to the presence of Methylparaben, this product may cause respiratory sensitization in susceptible individuals; subsequent exposure to very small amounts may cause an allergic reaction in sensitive individuals.

CONTACT WITH SKIN or EYES: Skin contact can cause mild irritation, which is alleviated upon rinsing with soap and water. Due the presence of Benzyl Alcohol (a weak skin sensitizer) and Methylparaben, skin contact may cause an allergic reaction in sensitive individuals; subsequent exposure to very small amounts may cause an allergic reaction in sensitive individuals, with symptoms of redness, itching, and welts. Eye contact may cause mild to moderate irritation, redness, and tearing.

SKIN ABSORPTION: The Benzyl Alcohol component of this product may be absorbed through the skin. Skin absorption is not expected to contribute significantly to overall exposure.

INGESTION: Ingestion is not a significant route of occupational overexposure. Acute ingestion of large quantities of this product or chronic ingestion caused by poor hygiene practices may cause nausea, vomiting, and diarrhea. **INJECTION**: Though not anticipated to be a significant route of overexposure for this product, injection (via punctures or lacerations by contaminated objects) may cause redness at the site of injection.

GENERAL TOXICITY INFORMATION: Individuals who have had allergic reactions to products containing Benzyl Alcohol, Methylparaben, or any other components of this product may experience allergic reactions to this product. Persons using the product in therapeutic doses may experience redness, swelling, skin erosion, flaking skin, induration, ulceration, scabbing, vesicles, soreness, flu-like symptoms, muscle aches, itching, burning, headache, hypopigmentation, pain, rash, sensitivity, bleeding, fever, and diarrhea. Therapeutic use of this product may cause sensitivity to the sun and UV light and cause increased susceptibility to sunburn.

IRRITANCY OF PRODUCT: This product may mildly irritate contaminated tissue.

SENSITIZATION OF PRODUCT: The Benzyl Alcohol component of this product is a weak skin sensitizer; skin contact may cause an allergic reaction in sensitive individuals. The Methylparaben component of this product may cause respiratory and skin sensitization; subsequent exposure to very small amounts may cause an allergic reaction in sensitive individuals.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Overexposure to this product may cause the following health effects:

Acute: The primary health effects that may be experienced by medical personnel exposed to this product is mild irritation of contaminated skin. Although unlikely, inhalation may irritate the respiratory system. Eye contact will cause irritation.

Chronic: Due to the presence of potential skin and/or respiratory sensitizers, susceptible persons may experience allergic reaction.

TARGET ORGANS:

Acute: Occupational Exposure: Skin, eyes. Therapeutic Doses: Skin.

Chronic: Occupational Exposure: Skin. Therapeutic Doses: Skin.

TOXICITY DATA: Currently, there are no toxicity data available for the active component of this product, Imiquimod.

CARCINOGENIC POTENTIAL: In an oral (gavage) rat carcinogenicity study, Imiquimod was administered to Wistar rats on a 2X/week (up to 6 mg/kg/day) or daily (3 mg/kg/day) dosing schedule for 24 months. No treatment related tumors were noted in the oral rat carcinogenicity study up to the highest doses tested in this study of 6 mg/kg administered 2X/week in female rats (87X MRHD based on weekly AUC comparisons), 4 mg/kg administered 2X/week in male rats (75X MRHD based on weekly AUC comparisons) or 3 mg/kg administered 7X/week to male and female rats (153X MRHD based on weekly AUC comparisons).

In a dermal mouse carcinogenicity study, Imiquimod cream (up to 5 mg/kg/application Imiquimod or 0.3% Imiquimod Cream) was applied to the backs of mice 3X/week for 24 months. A statistically significant increase in the incidence of liver adenomas and carcinomas was noted in high dose male mice compared to control male mice (251X MRHD based on weekly AUC comparisons). An increased number of skin papillomas was observed in vehicle cream control group animals at the treated site only. The quantitative composition of the vehicle cream used in the dermal mouse carcinogenicity study is the same as the vehicle cream used for this product, minus the active moiety (Imiquimod).

In a 52-week dermal photo-carcinogenicity study, the median time to onset of skin tumor formation was decreased in hairless mice following chronic topical dosing (3X/week; 40 weeks of treatment followed by 12 weeks of observation) with concurrent exposure to UV radiation (5 days per week with the Imiquimod) Cream vehicle alone. No additional effect on tumor development beyond the vehicle effect was noted with the addition of the active ingredient, Imiquimod, to the vehicle cream.

The excipient components of this product are listed by agencies tracking the carcinogenic potential of chemical compounds, as follows:

The remaining components of this product are not found on the following lists: U.S. EPA, U.S. NTP, U.S. OSHA, U.S. NIOSH, GERMAN MAK, IARC, or ACGIH and therefore are neither considered to be nor suspected to be cancer-causing agents by these agencies.

REPRODUCTIVE TOXICITY INFORMATION: This product is rated as Pregnancy Category C (RISK CANNOT BE RULED OUT. Adequate, well controlled human studies are lacking, and animal studies have shown risk to the fetus or are lacking as well. There is a chance of fetal harm if the drug is given during pregnancy; but the potential benefits may outweigh the potential risk). Listed below is information concerning the effects of this compound on animal or human reproductive systems.

Mutagenicity: Imiquimod revealed no evidence of mutagenic or clastogenic potential based on the results of five in vitro genotoxicity tests (Ames assay, mouse lymphoma L5178Y assay, Chinese hamster ovary cell chromosome aberration assay, human lymphocyte chromosome

aberration assay and SHE cell transformation assay) and three in vivo genotoxicity tests (rat and hamster bone marrow cytogenetics assay and a mouse dominant lethal test).

Embryotoxicity/Teratogenicity/Reproductive Toxicity: The components of this product are not reported to cause mutagenic, embryotoxic, teratogenic or reproductive toxicity effects in humans. Daily oral administration of Imiquimod to rats, throughout mating, gestation, parturition and lactation, demonstrated no effects on growth, fertility or reproduction, at doses up to 87X MRHD based on AUC comparisons.

ACGIH BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, ACGIH Biological Exposure Indices (BEIs) have not been determined for the components of this product.

Section XII – ENVIRONMENTAL IMPACT INFORMATION/ECOLOGICAL INFORMATION:

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This product has not been tested for soil absorption or mobility. The following information is available for the components of this product:

BENZYL ALCOHOL:

Experimental Koc values for Benzyl Alcohol are < 5 for three different soils; Apison (0.11% organic carbon), Fullerton (0.06% organic carbon), and Dormont (1.2% organic carbon). An experimental Koc of 15 was determined for Benzyl Alcohol on a red-brown Australian soil (1.09% organic carbon). According to a classification scheme, these Koc values suggest that Benzyl Alcohol is expected to have very high mobility in soil.

CETYL ALCOHOL:

The Koc of this material is estimated as 25,000, using a water solubility of 4.122X10-2 and a regression-derived equation. According to a classification scheme, this estimated Koc value suggests that this compound is expected to be immobile in soil.

GLYCERIN:

Based on an experimental log octanol/water partition coefficient of -1.76 and its water solubility, 1,220,000 mg/L at 5°C, soil adsorption coefficients for Glycerin can be estimated at 3 and 2, respectively, using regression-derived equations. The magnitude of these values indicate that glycerin will display very high mobility in soil.

STEARYL ALCOHOL:

The Koc of this compound is estimated as 1.8X10+5, using a water solubility of 1.1X10-3 mg/L at 25°C and a regression-derived equation. According to a classification scheme, this estimated Koc value suggests that this material is immobile in soil.

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence or biodegradability. The following information is available for the components of this product:

BENZYL ALCOHOL:

If released to air, a vapor pressure of 0.094 mm Hg at 25°C indicates Benzyl Alcohol will exist solely as a vapor in the ambient atmosphere. Vapor-phase Benzyl Alcohol will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 17 hours. If released to soil, Benzyl Alcohol is expected to have very high mobility based upon Koc values of less than 5 to 15 measured in various soils. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 3.1X10-7 atm-cu m/mole. Benzyl Alcohol is not expected to volatilize rapidly from dry soil surfaces based on its vapor pressure. Benzyl Alcohol is expected to undergo biodegradation under both aerobic and anaerobic conditions based upon results in a number of aqueous biodegradation tests. If released into water, Benzyl Alcohol is not expected to adsorb to suspended solids and sediment based upon the Koc data. Volatilization from water surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 75 days and 2.2 years, respectively. Hydrolysis is not expected to be an important environmental fate process since Benzyl Alcohol lacks hydrolyzable functional groups.

CETYL ALCOHOL:

If released to air, a vapor pressure of 6X10-6 mm Hg at 25°C indicates this compound will exist in both the vapor and particulate phases in the atmosphere. Vapor-phase material will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 16 hours. Particulate-phase material will be removed from the atmosphere by wet or dry deposition. If released to soil, this compound is expected to have no mobility based upon an estimated Koc of 25,000. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 4.6X10-2 atm-cu m/mole. However, adsorption to soil is expected to attenuate volatilization. Various biological screening studies have demonstrated that this material biodegrades both aerobically and anaerobically. If released into water, this compound is expected to adsorb to suspended solids and sediment based upon the estimated Koc. Volatilization from water surfaces is expected to be an important fate process based upon this compound's estimated

Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 23 hours and 12 days, respectively. However, volatilization from water surfaces is expected to be attenuated by adsorption to suspended solids and sediment in the water column. The estimated volatilization half-life from a model pond is 1.8 years if adsorption is considered. Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions.

GLYCERIN:

If released to soil, glycerin is expected to undergo rapid biodegradation under aerobic conditions. It is expected to display very high mobility in soil and it is not expected to significantly volatilize to the atmosphere. If released to water, glycerin is expected to rapidly degrade under aerobic conditions. Biodegradation in seawater and under anaerobic conditions is also expected. Glycerin is not expected to bioconcentrate is fish and aquatic organisms nor is it expected to adsorb to sediment and suspended organic matter. Volatilization to the atmosphere is expected to be slower then for water itself. If released to the atmosphere, Glycerin may undergo a gas-phase oxidation with photochemically produced hydroxyl radicals with a half-life of 33 hrs. It may also undergo atmospheric removal by wet deposition processes.

STEARYL ALCOHOL:

Based on a classification scheme, an estimated Koc value of 1.8X10+5, determined from a water solubility of 1.1X10-3 mg/L and a regression-derived equation, indicates that this compound is expected to be immobile in soil. Volatilization of This material from moist soil surfaces may be expected to be an important fate process given an estimated Henry's Law constant of 8.41X10-4 atm-cu m/mole, derived from a vapor pressure of 2.7X10-6 mmHg at 25°C, and its water solubility. However, adsorption to soil is expected to attenuate volatilization. This material is not expected to volatilize from dry soil surfaces based upon its vapor pressure. Biodegradation of this compound may be an important fate process in soil based on a mixed shake flask culture study. Based on a classification scheme, an estimated Koc value of 1.8X10+5, determined from a water solubility of 1.1X10-3 mg/L and a regression-derived equation, indicates that This compound is expected to adsorb to suspended solids and sediments. Volatilization from water surfaces is expected based upon an estimated Henry's Law constant of 8.4X10-4 atm-cu m/mole, calculated from its water solubility and vapor pressure, 2.7X10-6 mmHg, values. Using this Henry's Law constant and an estimation method, volatilization half-lives for a model river and model lake are 2.8 hours and 7 days, respectively. However, volatilization from water surfaces is expected to be attenuated by adsorption to suspended solids and sediment in the water column. A percent theoretical oxygen demand value of 0.3 in 24-hrs using a Warburg test suggests that biodegradation may not be an important fate process in water. According to a model of gas/particle partitioning of semi-volatile organic compounds in the atmosphere, this material, which has a vapor pressure of 2.7X10-6 mm Hg at 25°C, will exist in both the vapor and

particulate phases in the ambient atmosphere. Vapor-phase material is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be about 14 hours, calculated from its rate constant of 2.67X10-11 cu cm/molecule-sec at 25°C that was derived using a structure estimation method. Particulate-phase material may be removed from the air by wet or dry deposition. Using the Warburg test which employs activated sludge, this compound gave a theoretical oxygen demand of 0.3, 0.5, and 0.3 percent in 6, 12, and 24 hours. However, using an acclimated mixed shake flask culture with incremental substrate addition of this material, biomass yield reached 54.5 percent after seven days. Given sufficient time in contact with adapted microbial species under conditions otherwise non-limiting, the complete disappearance of this compound as identifiable molecular species will occur.

BIOACCUMULATION: This product has not been tested for bioconcentration. The following information is available for the components of this product:

BENZYL ALCOHOL:

An estimated BCF of 1 was calculated for Benzyl Alcohol, using a log Kow of 1.1 and a regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is low.

CETYL ALCOHOL:

In a 3-day static exposure study using golden orfe fish (Leuciscus idus melanotus), a bioconcentration factor (BCF) of 56 was observed. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is moderate, provided the compound is not metabolized by the organism. A 24-hr BCF of 17000 was observed in algae (Chlorella fusca).

GLYCERIN:

Based on an experimental log octanol/water partition coefficient of -1.76 and its water solubility, 1,220,000 mg/L at 5°C, bioconcentration factors for Glycerin can be estimated at 3 and 0.2, respectively, using regression-derived equations. The magnitude of these values indicate that bioconcentration of Glycerin in fish and aquatic organisms will not be significant. Log KOW = -1.76.

STEARYL ALCOHOL:

An estimated BCF value of 2.8X10+4 was calculated for this compound, using an experimental water solubility of 1.1X10-3 mg/L at 25°C and a recommended regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is very high, provided the compound is not metabolized by the organism.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No specific information is currently available on the effect of this product on plants or animals in the environment. This product may be harmful to contaminated plant and animal life, especially in large quantities. Information on components of this product is available as follows:

BENZYL ALCOHOL:

Bioconcentration: An estimated BCF of 1 was calculated for Benzyl Alcohol, using a log Kow of 1.1 and a regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is low.

CETYL ALCOHOOL:

Bioconcentration: In a 3-day static exposure study using golden orfe fish (Leuciscus idus melanotus), a Cetyl Alcohol bioconcentration factor (BCF) of 56 was observed; a 24-hours BCF of 17000 was observed in algae (Chlorella fusca)

GLYCERIN:

Bioconcentration: Based on an experimental log octanol/water partition coefficient of -1.76 and its water solubility, 1,220,000 mg/L at 5°C, bioconcentration factors for Glycerin can be estimated at 3 and 0.2, respectively, using regression-derived equations. The magnitude of these values indicate that bioconcentration of Glycerin in fish and aquatic organisms will not be significant. Log KOW = -1.76.

STEARYL ALCOHOL:

Bioconcentration: An estimated BCF value of 2.8X10+4 was calculated for Octadecanol, using an experimental water solubility of 1.1X10-3 mg/L at 25°C and a recommended regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is very high, provided the compound is not metabolized by the organism.

ECOTOXICITY: No specific information is currently available on the effect of this product on plants or animals in the environment. This product may be harmful to contaminated terrestrial and aquatic plant and animal life, especially in large quantities. The following are aquatic toxicity data currently available for components of this product:

BENZYL ALCOHOL:

LC50 (Pimephales promelas fathead minnows) 24 hours = 770 mg/L

LC50 (Pimephales promelas fathead minnows) 48 hours = 770 mg/L (static bioassay in Lake Superior water at 18-22°C)

LC50 (Pimephales promelas fathead minnows) 72 hours = 480 mg/L (static bioassay in Lake Superior water at 18-22°C)

LC50 (Pimephales promelas fathead minnows) 96 hours = 460 mg/L (static bioassay in Lake Superior water at 18-22°C)

LC50 (Lepomis macrochirus bluegill sunfish) 96 hours = 10 ppm/L (static bioassay in fresh water at 23°C, mild aeration after 24 hours)

LC50 (Medina beryllina tidewater silverside fish) 96 hours = 15 ppm (static bioassay in synthetic seawater at 23°C, mild aeration after 24 hours)

LC50,S (Lepomis macrochirus bluegill sunfish) 96 hours = 10 mg/L

LC50, S (Medina beryllina tidewater silverside fish) 96 hours = 15 mg/L

LC50 (Daphnia) 24 hours = 55; 400 mg/L

LC50 (Petromyzon marinus larvae) 24 hours = >5 mg/L

EC50 (Photobacterium phosphoreum) 30 minutes = 71 mg/L

EC50 (Photobacterium phosphoreum) 5 minutes = 50 mg/L

EC50 (Scenedesmus quadricauda) 3 hours = 79 mg/L

EC50 (Haematococcus pluvialis) 4 hours = 2,600 mg/L

EC50 (Anabaena cylindrica) 3 hours = 90 mg/L

EC50 (Anabaena variabilis) 3 hours = 35 mg/L

EC50 (Chlorella pyrenoidosa) 3 hours = 95 mg/L

ECOTOXICITY (continued):

GLYCERIN:

EC0 (Pseudomonas putida bacteria) 16 hours = >10,000 mg/L

EC0 (Microcystis aeruginosa algae) 8 days = 2,900 mg/LGLYCERIN (continued):

EC0 (Scenedesmus quadricauda green algae) 7 days = > 10,000 mg/L

EC0 (Entosiphon sulcatum protozoa) 72 hours = 3,200 mg/L

EC0 (Uronema parduczi Chatton-Lwoff protozoa) = > 10,000 mg/L

LC50 (goldfish) 24 hours = > 5,000 mg/

STEARYL ALCOHOL:

NOEC (Streptococcus mutans bacteria) 24 hours = >3.3 mg/L

NOEC (Candida albicans fungi) 30 hours = 10 g/L

NOEC (Mucor mucedo fungi) 30 hours = 10 g/L

NOEC (Trichophyton mentagrophytes fungi) 5 days = 10 g/L

OTHER ADVERSE EFFECTS: No component of this product is known to have ozone depletion potential.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Section XIII – DISPOSAL INFORMATION:

DISPOSAL METHODS: It is the responsibility of the generator to determine at the time of disposal whether the product meets the criteria of a hazardous waste per regulations of the area in which the waste is generated and/or disposed of. Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. Shipment of wastes must be done with appropriately permitted and registered transporters.

DISPOSAL CONTAINERS: Waste materials must be placed in and shipped in appropriate 5-gallon or 55-gallon poly or metal waste pails or drums. Permeable cardboard containers are not appropriate and should not be used. Ensure that any required marking or labeling of the containers be done to all applicable regulations.

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials.

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations. This product, if unaltered by handling, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. All gowns, gloves, and disposable materials used in the preparation or handling of this drug should be disposed of in accordance with established hazardous waste

disposal procedures. Handle as if capable of transmitting infectious agents. Incineration is recommended. Reusable equipment should be cleaned with soap and water. **U.S. EPA WASTE NUMBER**: Not applicable.

Section XIV – TRANSPORTATION INFORMATION:

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING REGULATIONS: This product is NOT classified as hazardous under regulations of U.S. DOT 49 CFR 172.101.

Section XV – REGULATORY INFORMATION:

UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for any component of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITIES (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: This product is regulated by the Food and Drug Administration; it is not subject to requirements under TSCA.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): The components of this product are not on the California Proposition 65 lists.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

Section XVI – OTHER INFORMATION:

All information contained herein is offered with good faith and belief that it is accurate. **THIS MATERIAL SAFETY DATA SHEET SHALL NOT BE DEEMED TO CREATE ANY WARRANTY OF ANY KIND (INCLUDING WARRANTY OF MERCHANTIBILITY OR FITNESS FOR A PARTICULAR PURPOSE).** In the event of an adverse incident associated with this material, this safety data sheet is not intended to be a substitute for consultation with appropriately trained personnel. Nor is this safety data sheet intended to substitute for product literature which may accompany the Finished product.