MATERIAL SAFETY DATA SHEET
(Approved by U.S. Department of Labor "Essentially Similar" to Form OSHA-20)
Complies with U.S. Hazard Communication Standard and Canadian WHMIS Regulations

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Section I - IDENTIFICATION

TRADE NAME: PATTER-technical grade

CLASSIFICATIONS:
Chemical Name & Formula (TSCA Inventory): Cyclohexane, 1-methyl-4-(1-methyleneoxy) - C4H8
Common Names: citrus terpenes, orange terpenes, mandarinene
CAS Number: 5868-27-5

WHMIS Class:
Class 3 - Division 2: Combustible Liquids
Class 2 - Division 25

SHIPPING CLASSIFICATIONS:
Proper Shipping Name: TERPENE HYDROCARBONS, N.O.S.
Hazard Class: 3 (3.3 for Canada)
Identification No.: UN3518
Packing Group: III

Label / Placard [as per requirements for FLAMMABLE LIQUIDS]

Section II - IMPORTANT COMPONENTS

VOLATILE INGREDIENTS: D-limonene (solvent) is the major component (technical grade 95%) - with balance other terpene hydrocarbons and oxygenated compounds - alkanes, monoalcohols, aldehydes/esters. Product is a by-product of citrus, entirely of natural origin, and to the best of our knowledge and belief contains no artificial flavors, excipients, or preservatives restrict excessing tolerances established by the FDA. D-limonene does NOT contain lead, cadmium, mercury, or hexavalent chromium or some in contact with these chemicals since it is a citrus derived essential oil produced by steam distillation. Further, d-limonene is packaged in food grade containers with lead lines that do NOT contain lead, cadmium, mercury, or hexavalent chromium. D-limonene does NOT contain and is NOT manufactured with any of the Class I or II ozone-depleting substances listed under the United States Clean Air Act of 1990.

Section III - PHYSICAL DATA

Boiling Point: Technical Grade 140°F
Specific Gravity @ 20°C: 0.828-0.843
Refractive Index @ 20°C: 1.471-1.474
Optical Rotation: +96° - +104°
Vapor Pressure @ 20°C: 2mmHg
Peroxidation by Volume: 65% less than 1
Evaporation Rate (Ethanol): Negligible
Solubility in Water: Not applicable for oil
Viscosity @ 25°C: 1.75
Appearance and Odor: Clear liquid, variable colorless to yellow cast with strong citrus odor

Section IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (TCC): 115°F, 117°F, 119°F
Flammable Limits (@ 302°F): Lower 0.7%, Upper 6.1% (identified for technical grade only)
Extinguishing Media: CO2 foam and dry chemicals
Special Fire Fighting Procedures: SCBA recommended. Smother to exclude air. Do not use water. Handle as an oil fire, Class B fire procedures.
Unusual Fire and Explosive Hazards: Combustible liquid. Keep away from heat, sparks, and open flames. Guard against spontaneous combustion of improperly discarded oily rags.
Section V - HEALTH HAZARD DATA

Route of Exposure:
- Eyes, Skin Contact, Inhalation

Health Hazard from Acute Exposure:
- Harmful if swallowed. Inhalation may cause vomiting, headache, and other respiratory problems. May be irritating to skin and eyes. Skin contact may cause skin irritation. Inhalation can cause nose, throat, and respiratory tract irritation, coughing, and aching.

Health Hazard from Chronic Exposure:
- Prolonged or repeated exposure can cause drying, itching, and dermatitis of skin. Estrogen is not listed as a carcinogen by NTP, OSHA, or IARC. OSHA and WRINS list dimerene as OAS or "generally recognized as safe."

Medical Conditions Generally Recognized as Being Aggravated by Exposure: None known.

EMERGENCY & FIRST AID PROCEDURES:

EYES:
- Remove contact lenses at once. Flush with water for at least 15 minutes. If irritation persists, see a physician.

SKIN:
- Wash affected area with copious amounts of soap and water. Call a doctor if irritation develops. Completely decontaminate clothing, shoes, and leather goods before re-use or discard.

INGESTION:
- Do not induce vomiting. Rinse mouth with water; then drink one glass of water. Contact physician immediately. Never give anything by mouth if victim is unconscious, in newly losing consciousness, or is convulsing.

INHALATION:
- If symptoms of overexposure are experienced, evacuate to fresh air. If symptoms persist, seek medical attention.

TLVs:
- Undetermined by ACGIH

PELs:
- Undetermined by OSHA

Toxicity Data:
- RIFM data acute oral LD₅₀ (rat) > 5 mg/kg; acute dermal LD₅₀ (rabbit) > 5 mg/kg
- Mutagenic data ORL-Mus T₀₂₀: 87 g/kg (Swiss-IETA)

Section VI - REACTIVITY DATA

Stability:
- Stable

Conditions to Avoid:
- Excessive heat

Incompatibility:
- Strong oxidizing agents and acidic agents, including acids, acids, peroxides, halogens, vinyl chloride, and iodine pentfluoride.

Hazardous Polymerization:
- None described.

Conditions to Avoid for Polymerization:
- Polymerization catalysts such as aluminum chloride and acidic agents.

Hazardous Decomposition Products:
- Smoke may be acrid and have irritating, burning gases that generate CO, CO₂, and smoke. Product is not an oxygen donor.

Section VII - SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled:
- Use protective gloves to avoid skin contact. Small spills can be wiped up. Large spills should be soaked up by dirt, sand, or other suitable absorbents for disposal. Do not hose spills down drains, sewers, or waterways. Dimerene may be toxic to aquatic organisms. Move leaking containers to a well-ventilated area. No smoking. Eliminate all sources of ignition. Minimize inhalation. Use NIOSH approved respiratory protection device. CAUTION: slippery on floor.

Waste Disposal Method:
- INCINERATE OR DISPOSE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

Section VIII - SPECIAL PROTECTION INFORMATION

Respiratory Protection:
- Not normally required, but if vapor concentration becomes high, use self-contained air mask (NIOSH approved).

Ventilation:
- Local exhaust should be adequate. Mechanical ventilation otherwise recommended if necessary.

Eye Protection:
- Emergency eye wash and shower stations.

Appropriate Hygiene Practices:
- Wash thoroughly after handling.

Personal Protective Equipment:
- Chemically resistant gloves such as neoprene, PVC, or butyl. Chemical splash goggles or face shield for eye protection.

Section IX - SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storage:
- Usual precautions for combustible liquids.

Handling and Storage Precautions:
- Store in small-quantity warehouse. Avoid contact with incompatible chemicals listed in Section VI. Store in tightly sealed, full containers. Store in glass, blow-fired, steel-lined steel, or epoxy-lined containers to preserve quality. Other Precautions:
- Product may expand slightly in storage causing pressure to build in container. Open container carefully if product appears to be under pressure. Drum lining may occasionally chip and fall to bottom of container after long storage or excessive handling. As a precaution, pour liquid through filter/strainer to catch small pieces of liner before blending or repackaging. Commerically clean empty containers before re-use. CAUTION: Do not weld or cut empty containers (Vapor May Ignite).

DETAILED TOXICOLOGY AND BIODEGRADATION REPORT AVAILABLE UPON REQUEST

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