

# D-LIMONENE APPLICATIONS

d-Limonene from Florida Chemical Company, Inc. is a very effective, biodegradable solvent and degreaser, occurring in nature as the main component of citrus peel oil. Due to its attractive citrus odor, versatility and GRAS rating ("Generally Recognized As Safe") from the US FDA, d-Limonene can be used safely and effectively in a wide range of products for an incredible number of applications.

The following chart identifies a few popular d-Limonene applications. The corresponding recommended concentration of d-Limonene may be used as a guide for developing effective blends. Please contact Florida Chemical Company for formulation assistance. For water-soluble products, Florida Chemical Company recommends the use of its proprietary emulsifier, *E-Z-Mulse*, to make "safe & easy" stable emulsions. *E-Z-Mulse* is essentially non-hazardous, nearly odorless, biodegradable, and does not contain suspect nonyl phenol found in other emulsifiers!

Revision Date: 29 October 2001

## Household/Institutional

Window Cleaner	2%
Counters – Kitchen and Bathroom	5%
Floors	5%
Sinks – Kitchen and Bathroom	5%
Bathtubs, Showers and Toilets	5%
Carpets – General Carpet Cleaner	5 to 20%
Jewelry Cleaner	10%
Stove Tops	10%
Exhaust Hoods	10%
Upholstery	10%
Tape Residue	10%
Carpets – Pre-Wash Spotter	15%
Driveway Oil Spots	20%
Ovens	25%
Grease Traps – Cleaning and Maintenance	25%
Hand Cleaners	20 to 30%
Graffiti Removal	25 to 50%
Bubble Gum Remover	30%
Floor Wax Stripper	40 to 50%
Air Freshener	90%

## Automotive

Glass Cleaner and Windshield Washer	2%
Exterior Wash	5%
Diesel Fuel Additive	5 to 10%
Tires	10%
Upholstery	10%
Wheels	10%
"Waterless" Hand Cleaners	20 to 30%
Engine Degreaser	20 to 100%
Adhesive/Bumper Sticker Removal	30%
Bug/Tar Removal	30%
Brake Cleaner	30 to 100%
Cosmoline Removal from Imports	100%
Maintenance/Parts Cleaning	100%
Parts Washers & Dip Baths	100%

## Adhesives

Adhesive Carrier for Manufacturing	10 to 40%
Adhesive Removal and Cleanup	10 to 100%

## Direct Solvent Replacement

Acetone	Isopropyl Alcohol
Benzene	Methyl Ethyl Ketone
Butyl Cellosolve	Mineral Spirits
CFC's	Toluene
Freon	Trichloroethylene
Glycol Ethers	Xylene
HCFC's	AND OTHERS...

## Paving

Hand Cleaner	20 to 30%
Asphalt Release Agent	80 to 100%
Extraction Testing	85 to 100%
Equipment Cleaning	100%

## Electronics

Computer Cleaner – External	5 to 20%
Printed Circuit Board Flux Removal	85 to 100%
Contact and Switch Cleaner	100%
Motor Windings	100%

## Repair and Maintenance

Hand Cleaner	20 to 30%
Parts Washers & Dip Baths	25 to 100%
Parts Cleaning	25 to 100%
Equipment Wipe Down	25 to 100%
Penetrating Oil	100%

## Marine Applications

Boat Cleaning	10 to 25%
Bilge Cleaning	20 to 30%
Oil Spill Cleanup – Vessel, Shore, Wildlife	20 to 100%

## Printing

Hand Cleaner	20 to 30%
Roller Wash	20 to 100%
Spill Cleanup	20 to 100%
General Cleanup	20 to 100%
Ink Well	100%

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### **Heat Transfer Fluid**

Cryogenic Applications	100%
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### **Metal Parts Manufacturing**

Floor Cleaning	10 to 20%
Parts Washers and Dip/Spray Baths	10 to 100%
Hand Cleaners	20 to 30%
Metal Polish	25 to 30%
Equipment Maintenance and Cleaning	20 to 100%

### **Warehouses**

General Cleanup	10 to 20%
Floor Scrubbing	20 to 30%

### **Airplanes/Airports/Aerospace**

General Cleaning	5 to 20%
Maintenance	20 to 100%
Parts Cleaning Prior to Assembly	20 to 100%
Runway Cleaning	25 to 40%
Exhaust Fume Residue Remover	100%
Cleaning Prior to Welding	100%

### **Flavors and Fragrances**

Extender - Concentration is Application Specific	
Flavor Additive - Consult FDA	500 PPM
Product Scenting	1 to 3%
Air Fresheners	90%
L-Carvone Mfg. (imitation spearmint)	100%

### **Special Effects Industry**

Adhesive Removal	10 to 20%
Paint Cleanup	20 to 100%
Epoxy Cleanup	25 to 100%
Mold Cleaning	25 to 100%
Mold Release Compound	100%

### **Sports Equipment Manufacturing**

Metal Degreasing	15 to 100%
Golf Club Gripping	100%
Adhesive Overflow Removal	100%
Printing Ink Excess Cleanup	100%
Ski Wax Removal	100%

### **Pesticide/Herbicide/Biocide** (subject to EPA approval)

Anti-Microbial/Disinfectant	3 to 10%
Flea & Tick Pet Shampoo (Approved)	4 to 10%
Insect Killer	10 to 30%
Weed Killer	10 to 100%

### **Water Treatment Plants**

Maintenance Cleaning	20 to 100%
Odor Control	100%

### **Oil and Gas Industry**

Odorant for Leak Detection	500 PPM
Pipeline Cleaning	10 to 25%
Maintenance Cleaning of Rigs	10 to 100%
Drilling Mud Loosening Agent	100%
Furnace/Water Heater Cleaner	100%

### **Industrial Odor Control**

Waste Plants	100%
Animal Waste Holding Areas	100%

### **Textiles**

Laundry Soap	2 to 5%
Laundry Pre-Spotter	10 to 20%
Fabric Wash	10 to 30%
Textile Equipment Cleaning	20 to 100%

### **Asbestos Abatement**

Asbestos Shingle and Tile Removal	100%
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### **Recycling**

Styrofoam Dissolving and Compacting	100%
Oil Can & Filter Recycling	100%

### **Cosmetics**

Makeup Removal	3 to 5%
Antibacterial Additive - Not approved in USA	5 to 10%
Nail Polish Removal	60 to 70%

### **Paints, Coatings and Resins**

Coating Carrier	10 to 30%
Cleanup of Brushes and Equipment	10 to 100%
Painting Preparation	10 to 100%
Resins and Plastics Manufacturing	100%

### **Medical and Pharmaceutical**

Equipment Cleaning	10 to 100%
Lice Treatment - Not approved in USA	3 to 5%
Cancer Research and Treatment	Experimental
Radioactive Contaminant Removal	Experimental
Dietary Antioxidant	Experimental
Acne Treatment	Experimental
Mouth Wash	Experimental
Equipment Sterilization	Experimental

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# D-LIMONENE

**Technical Grade • Food Grade • Lemon-Lime Grade**

*Product Data Sheet*

*Material Safety Data Sheet*

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## **PRODUCT DATA SHEET**

Preparation Date: 08/15/01

D-Limonene is a biodegradable solvent occurring in nature as the main component of citrus peel oil. D-Limonene's interesting chemical properties, pleasant citrus aroma, & FDA-GRAS rating ("generally recognized as safe") have earned the product phenomenal acceptance in many diverse chemical applications. D-Limonene can be used in its pure form, blended with most other solvents & drying oils, or easily emulsified to make water soluble cleaning products.

## **APPEARANCE & COLOR**

Clear water-white to slightly yellow liquid with a mild to strong citrus aroma depending on grade.

## **USES & APPLICATIONS**

Replacement for toxic chlorinated solvents, glycol ether, MEK (methyl ethyl ketone), xylene, Freon, and CFC's, parts cleaner, engine degreaser (automotive, aircraft and aerospace industries), electronics cleaning, tar and asphalt remover, asbestos shingle remover, graffiti remover, grease trap maintainer, lift station and sewage treatment applications, hand cleaner, floor cleaner, printing press cleaner, carpet stain cleaner, metal cleaner, aerosol ingredient, fragrance additive, odorant for petroleum industry, heat transfer medium, and possible candidate for a variety of medical applications including cancer and AIDS research.

## **PACKAGING**

D-Limonene is packaged in epoxy-lined containers as follows:

1-Gallon Pail	-	7 Pounds Net Weight	-	3.2 kg Net Weight
5-Gallon Pail	-	35 Pounds Net Weight	-	16 kg Net Weight
55-Gallon Drum	-	390 Pounds Net Weight	-	177 kg Net Weight

*Packaging continued next page*