

GREEN-SOL 750 – TECHNICAL DATA SHEET

A High Performance Versatile Bio-Solvent

What is Green-Sol 750?

Green-Sol 750 is the ultimate ozone-friendly, environmentally-safe, bio-solvent. The product is manufactured through a proprietary fermentation process using carbohydrate feedstock and renewable organic materials obtained from corn, soy beans and sunflower. Green-Sol 750 is a high performance versatile bio-solvent which is a clean and colorless liquid of low volatility (similar to water) with a characteristic bouquet odor.

Green-Sol 750 is based on esters of natural (L+) lactic acid that have found industrial applications as cleaners and degreasers because of their high performance as a versatile solvent.

A safe alternative to many toxic solvents

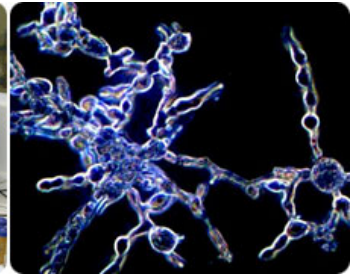
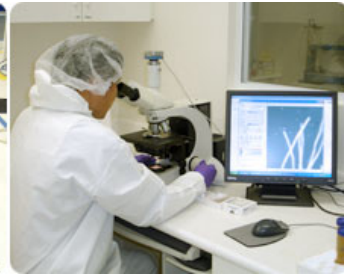
Green-Sol 750 is a genuine substitute for a variety of chlorinated, halogenated, aromatic and oxygenated solvents such as:

- 1,1,1-trichloroethane
- Methylene chloride
- Glycol ether EB (Butyl Cellosolve)
- Acetone
- Cellosolve acetate
- NMP
- Gamma Butyrolactone

Advantages of using Green-Sol 750

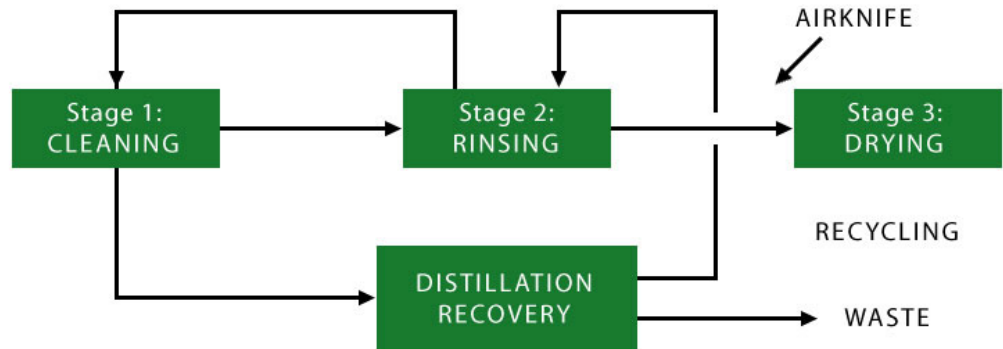
Green-Sol 750 has an excellent safety, environmental and toxicological record as a highly effective bio-solvent cleaner with the following advantages:

- Non-toxic to humans, animals, and aquatic life
- Not harmful to the environment or ozone layer
- Recoverable up to 98%
- High KB Value (over 500)
- Biodegradable
- Low temperature degreasing
- Regenerable
- Limited waste volume



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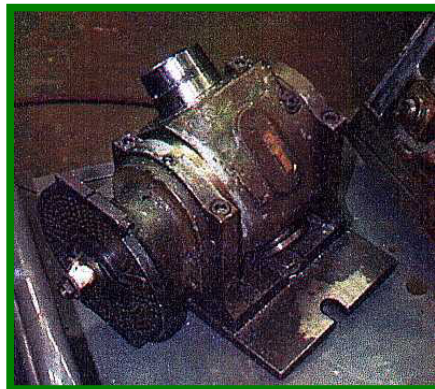
How Green-Sol 750 is recovered



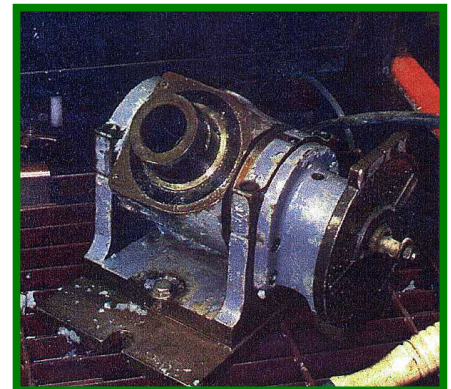
The substrate is cleaned by immersion or spraying in stage 1. Although heating or additional mechanical energy is not necessary, ultrasound can increase the performance of Green-Sol 750. The cleaning stage of the process may consist of one or several cleaning units, depending on substrates and cleaning requirements. The substrate is rinsed with clean Green-Sol 750 and the system is closed looped through a vacuum still.

Effectiveness

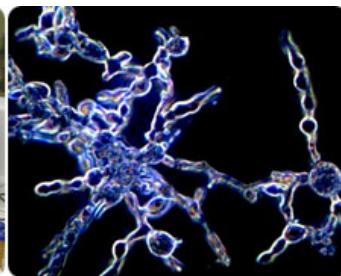
The cleaning efficiency of Green-Sol 750 was tested in a full scale coating plant. Prior to coating, a greasy metal part was spray cleaned at 25°C with a total solvent exposure time of 4 minutes. The drying was accomplished in an IR-oven set at 40°C. The metal part was absolutely clean after the test.



Before



After



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Effectiveness continued...

Results of several tests reveal that cleanliness levels obtained with Green-Sol 750 were slightly higher (98% of grease removed) than those obtained with trichloro-ethylene (97%).

The hydrophilicity of surfaces is good after degreasing. When hardmetal, stainless steel, aluminum, copper, carbon steel, and canthal were tested, their hydrophilicities were high, therefore simple operations after the degreasing step were ensured.

The degreasing efficiency of Green-Sol 750 for different types of contaminants was evaluated in an immersion process. The three contaminants tested were a mineral oil, a synthetic ester and a fatty acid. Several mixtures of these contaminants in different mixing ratios were loaded on metal parts.

Green-Sol 750 was equally efficient in all tests. Even by using an immersion process without any mechanical treatment or heating, the carbon contents of the surfaces after degreasing were as low as approximately 60 mg/m².

Compatibility with other materials

Green-Sol 750 was tested on several plastics and metal alloys. Metals are generally not corroded by Green-Sol 750, however prior to use, actual parts to be cleaned should be tested to confirm compatibility.

Compatible Materials: Aluminum 6061, Caron Steel, Choropren, Polyethelene, Polypropylene, Rubbe,r PTFE, Kalrez, PVDF, Latex, Stainless steel, Nylon, Teflon, Magnesium alloy AZ91A.

Incompatible Materials: ABS, Polycarbonate, BUNA-B, PVC, Viton

Physical Properties

Appearance: liquid

Odour: characteristic bouquet odour

Colour: colourless

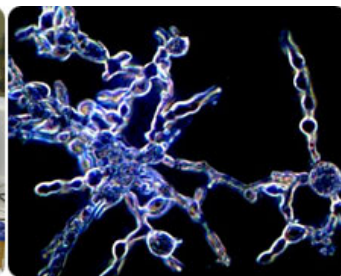
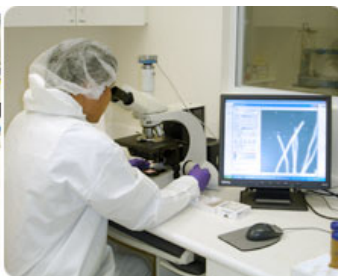
Boiling Point: 159°C

Flash Point: 63°C

Vapour Pressure (mm Hg at 25°C): 0.001

Viscosity (cSt at 20°C): 2.8 cP

Surface Tention: 34mN/m at 25°C



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Explosive Properties in Air: Lower 1.4 % volume 100°C
Upper 9.6 % volume 100°C

Drying

Green-Sol 750 with its high flash point and boiling point, is characterized by optimal physical properties for an organic cleaning agent: reduced combustibility but acceptable drying times. Typical values are 90 seconds in a vacuum (50 mbar at 50°C) and three minutes with warm pulsating air (50°C).

The energy needed to heat up 1 kg of water with 1°C (specific heat) is twice as high as for Green-Sol 750, therefore it evaporates more easily than water. Also, because the last rinse requires only Green-Sol 750, the corrosion problem caused by water rinsing does not occur.

Safety Precautions

When using Green-Sol 750, agitation or spraying methods that generate fine mists that can be ignited should be avoided, unless precautions such as inerting are taken. The maximal advisable operating temperature for Green-Sol 750 is 45°C. Green-Sol 750 should never be heated above its flashpoint and equipment should have safeguards to prevent heating above the flashpoint.

Waste Treatment

Waste Green-Sol 750 is recovered in a distillation column, and, as it is applied as a pure product, difficulties in making up the formulation afterwards are avoided. Through distillation, the major volume of Green-Sol 750 can be recycled. This gives a significant reduction in waste volumes compared to alkaline systems and leaves only minor quantities for waste disposal.

Environmental Safety

Green-Sol 750 is an environmentally safe product, with very low toxicity. Green-Sol 750 has zero ozone depleting potential (ODP) and does not contribute to the greenhouse effect. Various tests show Green-Sol 750 to be practically non-toxic, readily biodegradable, and extremely safe to handle.