
LENIUM^{®*} ES

Cleaning Solvent

Description

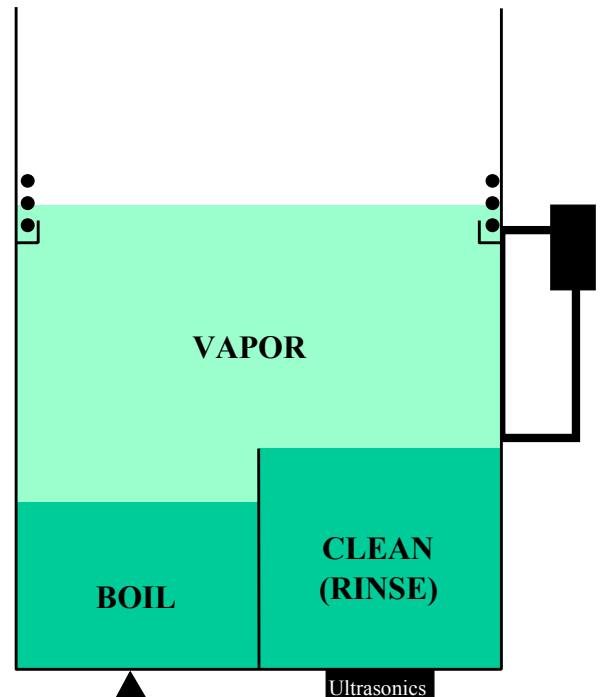
LENIUM ES is a binary azeotrope of *n*-Propyl Bromide and isopropanol formulated for use in electronics and precision cleaning applications. The fluid has physical properties and solvency characteristics that are similar to chlorinated solvents such as 1,1,1-trichloroethane and trichloroethylene. It is an aggressive vapor degreasing solvent used to remove a wide variety of soils in immersion and vapor cleaning applications.

For electronics cleaning applications, LENIUM ES is effective in the removal of solder flux, paste, and ionic residues from circuit assemblies. LENIUM ES is also suitable for precision cleaning applications in the removal of contaminants such as oils, greases, adhesives, resins, and waxes from metal substrates. It is a direct replacement for 1,1,1-trichloroethane, HCFC-141b, HCFC-225, hydrofluorocarbons, and methylene chloride in vapor degreasers.

Process

LENIUM ES is designed for use in a vapor degreasing process. The product can be used in existing vapor degreasing equipment (batch or in line), but emission control retrofits may be useful in reducing vapor losses. If existing equipment is utilized, it is necessary to adjust temperature control settings.

Petroferm has developed a comprehensive users manual that covers all aspects of operating a LENIUM ES vapor degreasing process. Topics discussed in the manual include process parameters, equipment start-up and operational procedures, solvent maintenance, and health, safety, and disposal information. If converting from another solvent to a LENIUM product, please



* LENIUM is a registered trademark of Petroferm Inc.

consult the operator manual and your Petroferm representative.

Typical Properties

The physical and environmental properties of LENIUM ES are compared to other halogenated solvents in Table 1.

Table 1.

	LENIUM ES	Trichloro-ethylene	HCFC-141b	HCFC-225	Methylene Chloride	1,1,1-TCA
Flash Point (TCC)	None	None	None	None	None	None
Boiling Point	154°F (68°C)	189°F (87°C)	90°F (32°C)	129°F (54°C)	104°F (40°C)	165°F (74°C)
Specific Gravity @ 25°C	1.25	1.46	1.24	1.55	1.33	1.32
Viscosity @ 25°C	0.49 cp	0.54 cp	0.43 cp	0.59 cp	0.43 cp	0.79 cp
Surface Tension (dynes/cm)	TBD	26.4	19.3	16.2	28.2	25.6
Vapor Pressure @ 20°C	110.8 mm Hg	57.8 mm Hg	593 mm Hg	283 mm Hg	349 mm Hg	100 mm Hg
Evaporation Rate (TCA = 1)	0.96	0.57	>1	>1	1.64	1
Specific Heat @ 25°C	0.27	0.22	ó	0.25	0.28	0.25
Heat of Vaporization	58.8 cal/g	57.2 cal/g	52.3 cal/g	33 cal/g	78.7 cal/g	57.5 cal/g
Solubility in Water	<100 ppm	110 ppm	180 ppm	330 ppm	140 ppm	70 ppm
Solubility of Water	2,500 ppm	300 ppm	420 ppm	300 ppm	6 ppm	500 ppm
Flammability Limits (vol %)	4 - 7.8	8 - 10.5	7.6 - 17.7	None	14 - 22	7 - 13
Kauri Butanol (KB) Value	>125	129	56	31	136	124
Atmospheric Lifetime	2-3 weeks	<1 year	10 years	5 years	<1 year	5 years
ACGIH TLV	25 ppm*	50 ppm	500 ppm	50 ppm	25 ppm	350 ppm

* *n*PB exposure limit not established. Manufacturer recommended exposure limit only.

Compatibility

LENIUM ES was tested for compatibility with metals according to MIL-T-81533A. In this test, metal coupons were submerged halfway in the refluxing fluid for twenty-four hours. The following metals showed no signs of corrosion.

Table 2.

Aluminum	Copper	Monel	316 Stainless Steel
Brass	Inconel	Nickel	Titanium
Carbon Steel 1010			Zinc

The compatibility of aluminum with LENIUM ES was further tested by scratching an aluminum coupon beneath the surface of the solvent. Several hours elapsed before signs of corrosion were noticed. In contrast, when 1,1,1-trichlorethane is subjected to the same test, corrosion can be seen immediately.

The table on the following page details the results of compatibility testing with selected plastic and elastomeric materials. This table is intended only as a general guide. Petroferm recommends that you test compatibility with the particular materials in question under your actual use conditions.

Table 3. Effects of LENIUM ES on Plastics and Elastomers

Plastic / Elastomer	Percent (%) Weight Change				Percent (%) Thickness Change			
	77°F (25°C) 1 Hour	150°F (66°C) 1 Hour	150°F (66°C) 1 Month	Control ¹ 150°F (66°C) 1 Month	77°F (25°C) 1 Hour	150°F (66°C) 1 Hour	150°F (66°C) 1 Month	Control ¹ 150°F (66°C) 1 Month
ACETAL (Delrin, Celcon)	0.01	0.04	4.58	0.32	0.00	1.58	2.52	1.90
ACRYLIC (Lucite, Plexiglas)	Stopped	Stopped	Stopped	0.15	Stopped	Stopped	Stopped	0.60
ACRYLONITRILE	Stopped	Stopped	Stopped	0.04	Stopped	Stopped	Stopped	1.55
BUNA N	19.69	22.60	31.61	0.11	10.14	7.89	13.82	3.57
BUNA S	27.31	25.05	106.47	-0.06	6.29	7.45	30.43	4.35
BUTYL RUBBER	1.33	2.95	8.86	-0.03	0.35	3.19	6.74	2.70
CPVC	26.88	39.98	Stopped	-0.03	20.54	41.11	Stopped	2.70
EP RUBBER	41.87	55.42	53.53	-0.23	19.42	18.51	10.71	-1.88
EPDM	4.90	-0.37	-19.02	-0.63	-2.16	-4.48	-9.70	6.25
EPICHLOROHYDRIN	-10.31	-9.19	-21.36	-0.70	-5.50	-6.42	-8.26	6.96
FIBERGLASS	-0.08	0.91	Stopped	-0.61	2.45	-0.26	Stopped	1.71
FLUOROELASTOMER	-9.69	85.21	-10.34	-0.41	11.90	2.34	-8.19	4.85
G-10 EPOXY GLASS	0.03	0.03	5.27	-0.35	0.00	-1.47	15.63	2.42
HDPE	0.38	1.07	11.16	-0.02	0.32	0.32	2.88	0.32
Hypalon®	49.04	45.22	0.84	-2.22	15.63	11.88	0.99	2.04
NATURAL RUBBER	64.54	84.13	Stopped	0.24	12.57	19.70	Stopped	3.08
NEOPRENE	41.02	41.21	42.63	-0.78	16.94	12.58	6.95	2.73
NYLON	-0.02	-0.06	-1.51	-2.55	0.62	0.31	0.00	1.90
PBT (Valox, Gafite, Celanex)	0.01	0.04	2.20	-0.21	0.35	0.85	1.93	1.11
POLYCARBONATE (Lexan)	13.40	12.53	Stopped	-0.18	21.90	13.84	Stopped	0.32
POLYETHERIMIDE (Utem)	0.01	0.01	1.18	-0.64	-2.52	0.32	2.52	2.56
POLYPHENYLENE OXIDE (Noryl)	Stopped	Stopped	Stopped	-0.05	Stopped	Stopped	Stopped	1.92
POLYPROPYLENE	0.63	2.46	20.66	-0.02	-0.97	1.66	7.97	2.67
POLYSTYRENE	Stopped	Stopped	Stopped	-0.03	Stopped	Stopped	Stopped	1.58
POLYSULFIDE	-5.23	-12.76	-17.79	-0.44	-7.69	-6.35	-5.56	5.51
POLYSULFONE	Stopped	Stopped	Stopped	-0.36	Stopped	Stopped	Stopped	3.58
POLYURETHANE	8.38	13.14	71.42	-0.89	5.67	7.36	23.08	2.33
PVC, WHITE	5.91	15.58	149.37	-0.09	5.61	11.41	67.11	0.68
PVC, CLEAR	4.06	Stopped	Stopped	-0.10	3.86	Stopped	Stopped	4.53
SILICONE	11.42	12.29	31.31	-0.06	9.18	11.82	18.24	3.72
Teflon®	-0.08	-0.01	0.79	-0.01	0.00	0.29	3.45	1.15
TYGON	22.89	17.67	12.00	-0.46	9.29	9.35	8.63	5.67
UHMW POLYETHYLENE	0.25	1.07	11.53	-0.01	0.96	0.32	4.46	2.24
Viton® A/B	1.01	2.85	18.12	-0.22	-0.32	2.54	10.48	4.19
Viton® G/F	20.72	29.17	123.59	-0.63	9.06	12.15	28.97	3.10

1. Effect of temperature only. Sample kept at 150°F (66°C) with no solvent.

Hypalon and Viton are registered trademarks of DuPont Dow Elastomers. Teflon is a registered trademark of DuPont.

Environmental and Regulatory

Table 4.

Ozone Depletion Potential (ODP)	0.013 – 0.018*
Global Warming Potential (GWP)	Zero
Volatile Organic Compound (VOC)	Yes
Significant New Alternatives Program (SNAP)	Pending
Hazardous Air Pollutants (HAP)	No
National Emission Standards for Hazardous Air Pollutants (NESHAP)	Not regulated
Superfund Amendments and Reauthorization Act (SARA)	Not regulated
Resource Conservation and Recovery Act (RCRA)	Not regulated

* Source: US EPA. ODP may be greater at locations near the equator.

Safety and Toxicity	Please see Material Safety Data Sheet for detailed information.
Disposal	Petroferm recommends contacting your current or local environmental service company for disposal of this product. The most common and economical method of disposal is incineration of used material in compliance with all applicable government regulations. Used LENIUM ES can also be delivered to a solvent reclaimer.
Packaging	LENIUM ES is available in 5-gallon pails (50 lb/23 kg net, 57 lb/26 kg gross) and 55-gallon drums (550 lb/ 250 kg net, 588 lb/267 kg gross). Samples are available in one-quart and one-gallon containers.
Storage	LENIUM ES should be stored in the original container at temperatures below 140°F (60°C).
Shelf Life	The shelf life for this product is indefinite when it is stored in its original, sealed container at room temperature. However, the product should be inspected after the designated date on the product label (twenty-four months from the date of manufacture) prior to customer use.

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