



New Solvent Technology Offers Exceptional Cleaning Power While Meeting Long-Term Safety and Environmental Requirements

The Reasons to Switch Away from nPB Continue to Mount

The safety concerns around the use of n-propyl bromide (nPB) in the workplace continue to grow.

- On November 23, 2015, EPA published a final rule that added nPB (also known as 1-bromopropane and n-propyl bromide) to the Toxic Release Inventory (TRI) list of reportable chemicals. Facilities using nPB are expected to file TRI reporting forms containing release and waste management data for this chemical. nPB is reportable for the 2016 calendar year, with the first reporting forms due from TRI facilities by July 1, 2017.¹ nPB meets the Emergency Planning and Community Right-to-Know Act (APCRA) Section 313 (d)(2)(B) statutory listing criteria because it can reasonably be anticipated to cause cancer to humans.
- In May 2013, the National Toxicology Program (NTP) of the U.S. Department of Health and Human Services issued a Revised Draft Report on Carcinogens which concluded that nPB is “reasonably anticipated to be a human carcinogen.”²
- A panel of experts recently concurred with the NTP’s preliminary decision to list nPB as a “reasonably anticipated human carcinogen.”³
- Under the EPA’s Toxic Substances Control Act Work Plan, the risks from nPB to human health and the environment are also being assessed.⁴
- nPB is regulated by the EPA as a volatile organic compound (VOC) in aerosol coatings and as a substitute to ozone-depleting chemicals under the Clean Air Act, and as a hazardous material by the Department of Transportation.⁵
- In March 2014, the American Conference of Governmental Industrial Hygienists (ACGIH) changed its recommended time-weighted average threshold limit value for nPB from 10 ppm to 0.1 ppm (<http://www.acgih.org/resources/press/TLV2014list.htm>).

U.S. law requires employers to keep their workers safe from this recognized hazard. According to the U.S. Occupational Safety and Health Administration (OSHA), exposure to nPB can cause damage to the nervous system, as well as irritation of the eyes, mucous membranes, upper airways and skin. OSHA recommends reducing worker exposure in several ways, the two most effective being “eliminating the hazard of concern or substituting the hazardous substance with a less toxic / hazardous process.”⁶

As such, nPB users are faced with finding a replacement solvent that offers favorable solvency, safety and environmental properties to meet their cleaning, drying and lubricant deposition needs.

Introducing Honeywell Solstice® Performance Fluid

Solstice® Performance Fluid (PF) is the latest advancement in solvent technology developed by Honeywell, and offers significant long-term safety and environmental benefits when compared with nPB and other solvents.

Solstice PF is a powerful cleaning solution that has favorable toxicity properties, an OEL of 800 ppm, and is nonflammable. It is also not considered a VOC as determined by the U.S. Environmental Protection Agency (EPA), does not contribute to ground-level smog, and has a global warming potential (GWP) of 1. Solstice PF is suitable for electronics, metal, medical and precision

Soils that can be cleaned with Solstice PF

| | |
|-----------------|------------------|
| Mineral Oils | Heavy Grease |
| Silicone Oils | Vacuum Oils |
| Silicone Grease | Refrigerant Oils |
| Cutting Oils | Fluorinated Oils |

cleaning, and can be used in vapor degreasing equipment and aerosols. Honeywell is currently working with aerosol manufacturers to develop formulations that incorporate Solstice PF.

The solvent is compatible with a broad range of plastics, elastomers and metals, including high nickel and aluminum alloys. However, as with any product, compatibility testing is recommended prior to use.

Benefits of Honeywell Solstice® Performance Fluid

Cleaning Performance

- Excellent cleaning ability with common soils
- Superior wetting – cleans tight spaces
- Compatible with a large number of commonly used polymers and elastomers (such as PET, PTFE, polycarbonate, Viton and Neoprene)

Comparison of Solvent Physical Properties*

| Property | Solstice PF | nPB |
|---|-------------|------------|
| Boiling Point (°C) | 19 | 71 |
| Liquid Density (@ 20°C gm/mL) | 1.26 | 1.34 |
| Surface Tension (@ 20°C, dyne, cm) | 12.7 | 25 |
| Heat of Vaporization at Boiling Point (kJ/kg) | 194 | 246 |
| KB Value | 25 | 125 |
| Flash Point (°C) | None | None |
| OEL (PPM) | 800 | 0.1 |
| GWP (100 Year) | 1 | 0.31 |
| VOC (U.S.) | Exempt | Non-Exempt |

*As replacement solvents must satisfy a complex set of properties, physical properties are only one consideration in the analysis.

- Compatible with metals (such as aluminum, copper, titanium, magnesium/aluminum alloys)
- Recoverable or recyclable by simple flash distillation or through carbon adsorption with steam desorption
- Very stable – does not require stabilization in any applications tested
- Resistant to thermal and hydrolytic breakdown

Safety Performance

- Nonflammable per ASTM E681
- OEL of 800 ppm, as determined by Workplace Environmental Exposure Levels (WEELs), a committee of the Occupational Alliance for Risk Science (OARS)

Environmental Properties

- GWP of 1
- No hazardous air pollutants (HAPS)
- VOC-exempt as determined by U.S. EPA

Usage

- Degreasing
- Aerosols

Status: Solstice PF is commercially available. It is listed under EPA's Significant New Alternatives Policy (SNAP) program for use as an aerosol solvent (Federal Register, August 2012), in metal cleaning, electronics cleaning, precision cleaning, and as a carrier solvent in adhesives, coatings and inks (Federal Register, May 2013). It has also been added to the TSCA inventory (August 2012). Contact your Honeywell representative for more details.

¹ <http://www.epa.gov/toxics-release-inventory-tri-program/addition-1-bromopropane>

² National Toxicology Program (NTP): Revised Draft Report on Carcinogens – Monograph for 1-Bromopropane, U.S. Department of Health and Human Services. May 14, 2013

³ See the April 2013 NTP Update at http://ntp.niehs.nih.gov/NTP/PressCtr/NTP_News/2013/Update_April2013_508.pdf

⁴ See U.S. EPA TSCA Work Plan Chemicals at <http://www.epa.gov/oppt/existingchemicals/pubs/workplans.html>

⁵ See 40 CFR 59; 72 FR 30142, 30 May 2007, Final Rule; 72 FR 30168, 30 May 2007, Notice of Intended Rulemaking; and 49 CFR 172.101.

⁶ DHHS (NIOSH) Publication Number 2013-150, OSHA HA-3676-2013.

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