



VenPure® Polisher

Improving the Efficiency of Re-refinement of Spent Lubricating Oils

Summary

Discoloration is a problem that is typically experienced when spent lubricants are recovered via a sequence of physical treatments. The VenPure technology offers a complementary chemical treatment that may reduced/eliminate the need for a decolorization step using filtration by diatomaceous earth, clay or Activated Carbon.

Technology Description

There is currently a growing effort to recover lubricants by physical purification. The recovery of class I lubricants typically occurs through a number of purifying steps :

1. Removal of heavy metals by filtration
2. Pre-treatment : pH adjusted to 12 by aq. NaOH
3. Pre-flash :
 - o removal of water
 - o removal of light oil fraction
4. fractional distillation
 - o bottom = asphalt fraction
 - o top = gas oils
5. Decolorization : physical treatment : clay

The decolorization step is necessary, because the recovered lubricant may be discolored as much as Gardner 8. Not only represents the decolorization step a significant cost due to the purchase of clay or Activated Carbon and their disposal after usage, it also inevitably causes some yield loss.

VenPure treatment offers an chemical alternative/complement to the decolorization step. VenPure is offered as an aqueous solution containing NaOH, and it is therefore best added during the pre-treatment. This step intends to remove fatty esters by alkaline saponification at 130°C, followed by 48-hours decantation. When VenPure is added at during NaOH addition, it has proven to have a significant positive impact on lubricants as recovered by subsequent fractional distillation.

VenPure treatment does not leave any contaminant in the lubricant as it comes off the fractional distillation column. Its leftover products typically have no influence on the quality of the bottom asphalt fraction.

VenPure Polisher – product properties

VenPure Polisher is an aqueous formulation, which contains min. 20% of NaOH

- Specific Gravity: 1.4 (11.5 lb/gal)
- Appearance: Off-white liquid
- Viscosity: 60.4mPa.s @ 20°C
- Solubility: Can be diluted with water
- Stability: < 0.01% decomposition per year

VenPure benefits

- VenPure effectively **removes color** from spent lubes
- when added prior to distillation, VenPure does **not** leave any **left-over product** in the recovered lubricant
- **Excess** VenPure is **neutralized** during fractional distillation; the left-over product does not influence the quality of the asphalt fraction
- VenPure is a **liquid** formulation, that can easily be dosed into the existing saponification step – implementation of VenPure technology typically does **not** require any **equipment investment**
- VenPure Polisher S is a **stable** product – its safe use & handling requirements are similar to those for liquid caustic soda
- VenPure pre-treatment decreases/eliminates the need for a physical decolorization process (clay or Activated Carbon), thereby increasing the **cost-efficiency** of the total purification process

Application

VenPure is a pumpable liquid, that is best premixed with the 30% aqueous NaOH used for the saponification pre-treatment. It can also be added separately during the same pre-treatment step.

Efficient treatments have been achieved using a dosage ranging from 0.1 to 1.5% per recovered lubricant. The optimum dosage is best determined during an industrial

trial, as it depends on a variety of parameters, such as the required color, the specifics of the distillation, ...

Toxicity and First Aid

1. VenPure Polisher has dermal LD₅₀ of 100-500 mg/kg and, like 50% caustic soda, (NaOH) solutions can cause skin burns and irritations. The acute oral LD₅₀ of VenPure Polisher is 500-1000 mg/kg.
2. VenPure Polisher is *very corrosive to the eye* and should be handled according to generally accepted procedures for corrosive chemicals. In case of accidental contact, flush eyes with water and *seek immediate medical attention*.
3. Precautions should be taken to avoid direct skin contact or ingestion. In case of accidental contact, flood the affected area with copious amounts of water and then wash skin with soap and water.

Product Handling

1. *Personal Protection:* Protective rubber gloves, clothing, face shield or safety (splash) goggles should always be worn when handling VenPure Polisher .
2. *Handling:* In general, VenPure Polisher should be handled in the same manner as 50% caustic soda. It is classified as a non-flammable, corrosive liquid, and it is stable to shock. Due to the presence of NaOH, VenPure Polisher absorbs CO₂ forming insoluble carbonates. Consequently, it should not be unnecessarily exposed to air for extended periods.

VenPure Polisher will decompose and evolve hydrogen if overheated, subjected to neutral or acidic pH conditions, or brought into contact with oxidizing agents, metal salts or fine metallic precipitates of Ni, Co, Cu or Fe. VenPure reactions should always be carried out in adequately vented vessels with standard provisions for pressure relief. A nitrogen atmosphere is also recommended, as well as explosion proof equipment with proper grounding.

3. *Storage:* Accepted storage procedures for VenPure Polisher are the same as those for 50% liquid caustic soda.

Under normal storage conditions, the decomposition of VenPure Polisher is less than 0.01% per year. During extended storage under adverse conditions, H₂ pressure may develop over the solution. All closed containers should have at least 10% free volume and be checked periodically. Under these conditions, pressure build-up will be less than 1 psi per year at normal storage temperatures.

Storage

VenPure Polisher can be stored in stainless steel, mild steel, or approved fiberglass vessels. Stainless steel (316 SS or 304 SS) is recommended for piping, valves, pumps, etc. VenPure Polisher must NOT be stored in vessels which react with caustic soda, such as aluminum. Storage tanks should be adequately vented to minimize hydrogen gas build-up.

VenPure Polisher should be stored at *temperatures* above 65° F (18° C) to improve handling. The solution becomes viscous below 60° F (16° C) and can crystallize at temperatures below 55° F (13° C). To liquify, warm slowly to 70-90° F (21-32° C), making sure the container is vented; do not use live steam. The warmed material should then be agitated by rolling the container, or recirculated with a high volume pump until a homogeneous solution is obtained.

If piping used to transfer VenPure Polisher is exposed to temperatures below 55°F (13°C), it should be heat traced to improve handling. However, precautions should be taken to avoid excessively high temperature since VenPure Polisher may decompose resulting in the evolution of hydrogen gas and possible excessive line pressure.

Shipping and Waste Disposal

VenPure Polisher has been classed as a 'corrosive liquid' under US DOT regulations.

1. VenPure Polisher is a corrosive material (EPA hazardous waste #D002) and must be disposed of accordingly. VenPure Polisher can be disposed of (hydrolyzed) by initial dilution with a large excess of water, followed by slow addition of a dilute solution of acetic acid or acetone to the mixture. This procedure should be performed in a well ventilated area.

Provisions should be made to safely vent hydrogen gas given off during neutralization. VenPure Polisher should not be flushed to the sewer.

2. In case of accidental spillage, absorb the VenPure Polisher with an inert material such as sand or dolomite. Absorbed material should be hydrolyzed as described above.
3. Any vessels which have been used for reactions or storage of VenPure Polisher should be carefully vented, drained, washed, and adequately flushed with nitrogen and air before any repair operations are undertaken. Exposure to an open flame (e.g., welding torch) should be avoided.

Please feel free to contact us via ... Hvenpure@rohmbaas.com

Updated information can be found at : [Hhttp://www.venpure.com/H](http://www.venpure.com/H)

Find your local Rohm and Haas Representative : [Hhttp://www.venpure.com/contact.htm](http://www.venpure.com/contact.htm)