FP 5445
Rev: 0/12/2013

Hampford Research INC
Handcrafted Solutions For A High-Tech World

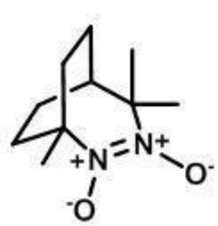
# HRI UVTS-52

**Product Description:**
**UVTS- 52** is a specially developed azodioxide, formulated for use as an inhibitor in UV catalyzed polymerization. It's unique chemical structure allows its function to be thermally reversible, inhibiting polymerization at room temperature while allowing the reaction to initiate when exposed to heat. Additionally, monomer blends that contain **UVTS-52** can be exposed to UV light without polymerizing, and will remain in monomer form until heat is applied. This makes it ideal for use in industrial adhesive and composite applications.

**Potential Applications:**

- Room temperature potlife stabilizers
- Line width and edge control in photoresists
- Contrast enhancer for stereolithography
- Photoactivated adhesives

## Technical Specifications:




**1,4,4-trimethyl-2,2-diazabicyclo[3.2.2]non-2-ene -2,3-dioxide**



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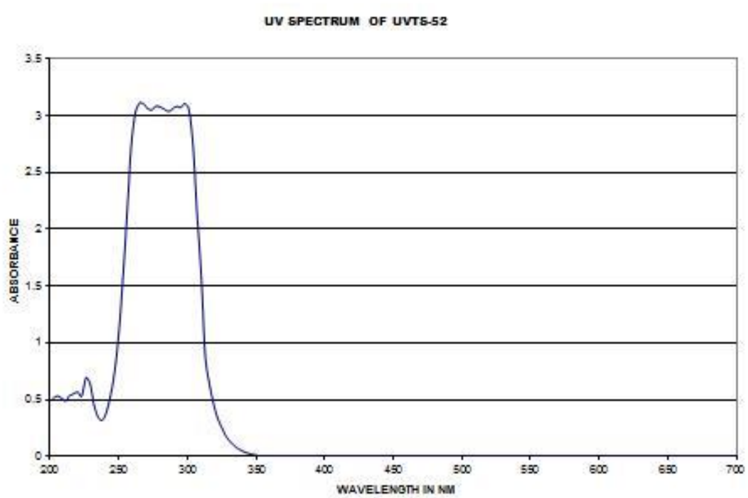
| | |
|---|---|
| TRADE NAMES: | HRI UVTS-52 |
| CAS NO. | 34122-40-2 |
| CHEMICAL FORMULA: | C10 H18 N2 O2 |
| REGISTRATIONS: | TSCA (USA) EINECS (EU) NDSL (Canada) |
| APPEARANCE: | Off white crystals |
| APPLICATIONS: | Thermally activated polymerization inhibitor |
| PURITY: | 99 % |
| FTIR: | Matches Standard |
| SHELF LIFE: | 6 months when stored indoors at 25 (+/- 5) deg C |

**Formulation recommendations:**

**Photoinitiator:** UVTS-52 has been shown to be a an effective inhibitor when used in concentrations varying from 0.1-1.0% by weight. When coupled with more active photoinitiators packages, UVTS-52 tends to exhibit the highest degree of thermal reversibility.




**Co-initiators:** The active wavelength of certain photoinitators can be modified through the incorporation of co-initiators. This can be beneficial in that UVTS-52 demonstrates light absorbance characteristics at around 275 nm, which may overlap with the photoinitiators optimum wavelength.



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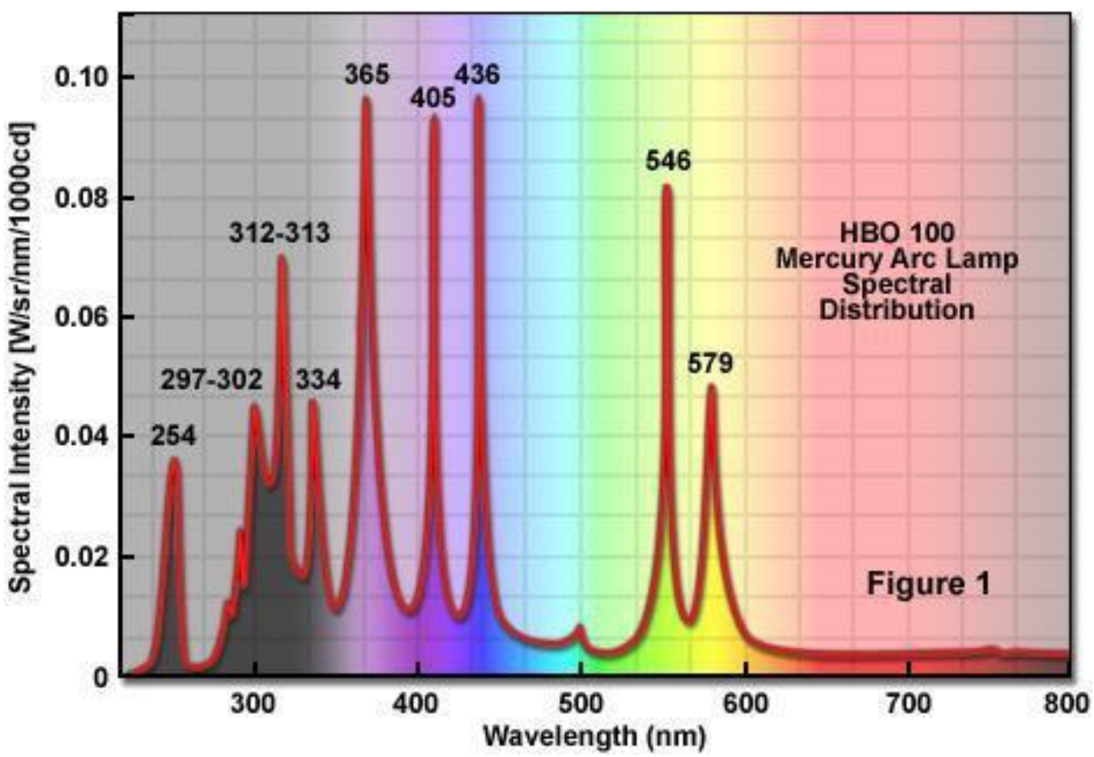
**Light source:** When exposing the UVTS-52 blend to UV radiation, it is important that light source emit radiation in the UV/visible wavelengths only. Any heat generated from IR light will block the effects of the UVTS 52, allowing the material to polymerize. Additionally, high intensity light can cause the UVTS-52 to break down, forming a more permanent inhibitor, preventing polymerization from occurring, even after heat exposure. Extended exposure to lower dosages of UV light has a positive effect, as it maximizes the amount of free acid complexed by the UVTS-52. This, in turn, provides for rapid polymerization when exposed to heat.

As such, it is recommended that a spot cure unit capable of providing UV and visible energy while filtering out IR radiation. Overall UV energy
(UVA) should be at least 10 watts per cm2 to allow for a deep penetration cure.

Other possible light sources include UV arc lamps modified with IR filters, light pipes or using monochromatic light sources.



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**Use of sensitizers:** Often times it is desirous to will include sensitizers as part of the adhesive formulation. Common materials such as 9,10-Diethoxyanthracene or ITX can be used without interfering with the thermal reversibility of the inhibitor.

**Use of wetting agents:** The addition of FC-4432 fluoro-surfactant considerably improved cured film continuity. Without surfactant the wet films can show a degree of "creep" and fish-eyes/craters due to the differential in top-to-bottom cure during the post bake.

**Post UV curing:** UVTS-52 works by sequestering the free acid produced by PAG's, and releasing it upon heat exposure. This can be accomplished either by exposing the entire area (to temperatures above 100 degrees C), or just a small area of the adhesive. This method is particularly effective when working with thick film adhesives, as they are able to retain heat and remain autocatalytic. Lab tests show a typical epoxy resin can sit for 10 minutes or more, prior to heat exposure, with no effect on curing.

When exposing the entire area to heat, there is a direct correlation between the time requirement and the temperature to which the surface is exposed, as shown below:

| Temperature (deg C) | Required exposure time |
|---|---|
| 100+ | Less than 1 minute |
| 75-85 | 1-5 minutes |
| 60-65 | 5 minutes or more |

For additional information visit our website www.hampfordresearch.com