

SaferWood

Thermex-FR



STATEMENT ON NON-TOXICITY, ENVIRONMENTAL IMPACT, AND DISPOSAL

The chemical engineer who created our fire-retardant, Thermex-FR, was intensely focused on making an earth-friendly product, long before it became popular or common as it is today. Our formula, created in 1981, is proprietary. It contains 7 ingredients plus water and is non-toxic and non-hazardous.

When wood burns, it sets off a series of complex chemical reactions. The combustion of wood results in the release of carbon dioxide, water vapor, and various gaseous products, as well as the formation of black solid residues like charcoal and ash.

Halogenated fire retardants interrupt combustion by releasing halogen radicals in the gas phase of the reaction. However, the chemicals in these fire retardants, when burned, produce highly toxic and corrosive gases, including hydrogen bromide and hydrogen chloride, which can be extremely dangerous in enclosed spaces, and toxic, sooty smoke.

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On the other hand, phosphorous-nitrogen fire retardants interrupt combustion in the condensed phase by generating phosphoric acids that promote the charring of wood, forming a protective, carbon-rich layer called intumescent. This char acts as a barrier, preventing heat and oxygen from reaching the underlying material and limiting the release of flammable gases.

Thermex-FR is a phosphorous-nitrogen fire retardant that reduces combustion and smoke, inhibits ember production, and slows the release of gases. Our formula doesn't contribute to toxic smoke, gases, runoff, or ash.

Further, Thermex-FR was evaluated by WA Department of Ecology: Static Acute Fish Toxicity Testing of the three phases of the fire retardant (wet, dry, sludge) determined that the fire retardant is non-hazardous. There was zero mortality in the test specimens, Rainbow Trout.

The Washington State Department of Ecology Method 80-12 is a 96-hour acute survival test using Rainbow Trout. Chemco, Inc., conducted the test as a requirement of the Department of Ecology for hazardous waste designation. Tested: liquid waste, wet sludge, and dried sludge. The testing resulted in 0% mortality on all three phases, which is considered excellent.

The test organisms used in the test are outlined in Table 2. The sample was tested using fish received on July 27, 2016.

Table 2. Test organisms (*Oncorhynchus mykiss*)

| | |
|------------------------------|--|
| Test organism age | 52 days post swim-up (hatch date 6/5/2016) |
| Mean weight | 0.34 g |
| Mean length | 34 mm |
| Ratio of longest to shortest | 1.2 |
| Loading | 0.56 g/L |
| Test organism source | Trout Lodge; Sumner, WA |

3.0 RESULTS

A summary of results for the dangerous waste characterization conducted on samples Liquid, Dry and Wet is contained in Table 3. Based on these results, the samples do not designate as either a dangerous or extremely hazardous waste. Copies of the laboratory bench sheets, statistical summaries of reference toxicant tests, and chain-of-custody form are provided in Appendices A through C.

Table 3. Summary of Results

| Sample ID | Concentration (mg/L) | Survival (# fish, N=30) | Percent Mortality | Dangerous Waste Designation |
|-----------|----------------------|-------------------------|-------------------|-----------------------------|
| Control | 0 | 30 | 0 | NA |
| Liquid | 10 | 30 | 0 | None |
| | 100 | 30 | 0 | |
| Dry | 10 | 30 | 0 | None |
| | 100 | 30 | 0 | |
| Wet | 10 | 30 | 0 | None |
| | 100 | 30 | 0 | |

4.0 QUALITY ASSURANCE

The most recently completed reference toxicant test was initiated August 2, 2016. The LC₅₀ of 83.1 µg/L copper fell within the acceptable range of mean ± two standard deviations of historical test results indicating that the test organisms were of an appropriate degree of sensitivity. The coefficient of variation (CV) for the last 21 tests was 29.9 percent, which is considered excellent by the Biomonitoring Science Advisory Board.

Class A certification demands a Flame Spread Index [FSI] of 25 or less and a Smoke Development Index of 450 or less. For all species, SaferWood has an FSI of 5-25 and an SDI of 45 or less.

Formaldehyde

SaferWood with Thermex-FR has been shown to emit 0.09ppm or less formaldehyde, per ASTM E1333 as conducted by the Hardwood Plywood & Veneer Association (HPVA).

Formaldehyde is naturally found in trees/wood and is also used as a component to manufacture Thermex-FR. Another component is a formaldehyde substitute that replaces formaldehyde in the synthesis to eliminate free formaldehyde emissions to the maximum extent possible. The curing process (required by the International Building Code) is the final conversion of Thermex-FR from a liquid to a solid [resin] permanently bound in the cells walls of the wood, thereby reducing formaldehyde emissions further.

The highest levels of airborne formaldehyde have been detected in indoor air, where it is released from various consumer products such as building materials (Pressed-wood products: plywood, particle board, paneling; foam insulation, wallpaper and paints, some synthetic fabrics, some cosmetics and personal products) and home furnishings. One survey reported formaldehyde levels ranging from 0.10 to 3.68 parts per million (ppm) in homes. Formaldehyde has also been detected in ambient air; the average concentrations reported in U.S. urban areas were in the range of 11 to 20 parts per billion (ppb). The major sources being power plants, manufacturing facilities, incinerators, and automobile exhaust emissions.

Thermex-FR is used for exterior wood building products. Formaldehyde does not accumulate in the environment, because it is broken down within a few hours by sunlight or by bacteria present in soil or water.

Ash

If SaferWood treated FRTW turns to ash in a fire, you must treat it as any other wood that has turned to ash. Runoff would primarily consist of trace amounts of non-toxic, non-hazardous phosphorous and nitrogen. Natural wood ash is not inherently toxic, but it can be hazardous under certain conditions, primarily when it is wet or inhaled. The specific risks depend on the original source of the wood and the level of exposure.

Disposal

Discard as you would untreated wood. SaferWood with Thermex-FR is non-toxic, non-hazardous, releases phosphorus and nitrogen during decomposition, and will biodegrade into the environment supporting a sustainable and renewable ecosystem.