PROPYLENE OXIDE, A REGISTERED FUMIGANT, A PROVEN INSECTICIDE

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Propylene oxide (PPO) is a low boiling (94 deg.F) liquid. It is a chemical class called "epoxides, because it has a shared oxygen atom that can react readily with many chemicals such as sulfur and amine compounds like DNA. It will react with hydroxyl (OH) groups when catalyzed with either an acid or base. This characteristic is why it is the primary building block for Propylene Glycol and other Polyglycols, which are used as food emulsifiers, surfactants, starch modifiers and urethane foams and polymers. Over 10 billion pounds of this versatile chemical are produced each year.

Propylene oxide has been used for food "sterilization" since 1958, and is the only FDA/EPA authorized sterilant allowed for reducing bacteria, mold and yeast in nutmeats and cocoa powder. It is also used to sterilize spices as well. Mixtures of propylene oxide have been used as an insecticidal fumigant in the past..

Properties of propylene Oxide

1) Description - Liquid at room temperature, boiling pt 94 deg F.
2) Flammability - flammable from 2%- 36% by volume in air
3) Inhalation limits- OSHA 100 ppm 8 hr tva, EPA 20 ppm. PPO has a noticeable odor.
4) Oral toxicity - converts to propylene glycol (GRAS) in the human stomach in less than a minute
5) Eye and skin irritation - can burn eyes and skin if not washed promptly
6) EPA rates PPO a "likely" carcinogen, California Prop 65 rates PPO as a carcinogen, not a teratogen.

Sterilizing equipment and procedures for food sterilization

1) Basic equipment would be a vacuum chamber and volatilizer
2) Procedures: Product is loaded into a vacuum chamber, a vacuum to 26" Hg is pulled, then vaporized POP is admitted. After 4hrs POP is removed by mullet air washes.

Present FDA and US EPA regulations pertaining to propylene oxide

Propylene oxide for food fumigation is regulated by CFR 40 Part 185.15. It establishes a residue "tolerance" of 300 ppm for nutmeats, cocoa powder and spices. ABERCO is actively supporting the reregistration of PPO under the new FQPA of 1996.

Insect fumigation tests

Inhouse testing indicates the PPO has a 100% kill of the Confused Flour Beetle adults, larvae and eggs at concentrations as low as 0.1 once of PPo per cubic ft. of chamber space when used in vacuum chambers with a 4 hour exposure at 80 deg.F

Additional test with the Indian Meal Moth and Warehouse Beetle indicate efficacy on all three stages of these pests as well. This work was done by the Dried Fruit Assoc. of CA.

Further test are being carried out at DFA to determine the limits of dosage and time under vacuum chamber conditions of an expanded list of pests utilizing 100% PPO.

Similar test will also be performed by DFA to determine the efficacy of non-flammable PPO/CO2 mixtures at ambient temperature and pressure. This data will be presented at the MBAO conference.

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