United States Environmental Protection Agency | Pesticides And Toxic Substances (7508W) | 738-F-91-101 September 1991

R.E.D. FACTS

Carbon Dioxide

Pesticide Reregistration

All pesticides sold or used in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered years ago be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, showing the human health and environmental effects of each pesticide. The Agency imposes any regulatory controls that are needed to effectively manage each pesticide's risks. EPA then reregisters pesticides that can be used without posing undue hazards to human health or the environment.

When a pesticide is eligible for reregistration, EPA announces this and explains why in a Reregistration Eligibility Document, or RED. This fact sheet summarizes the information about carbon dioxide presented in the RED for carbon and carbon dioxide.

Use Profile

Carbon dioxide is the active ingredient in four pressurized liquid and gas fumigant products used to control insects in enclosed indoor areas where grain or other food and feed crops are stored.

A ubiquitous, naturally-occurring gas found in the atmosphere and a product of animal metabolism, carbon dioxide is necessary for plant and animal life as it is essential for respiration. Carbon dioxide's best known use is for the carbonation of beverages. It also has many other non-pesticidal uses.

Regulatory History

Carbon dioxide was first registered by EPA in 1981, in an aerosol spray insecticide product. However, the registrant of these products has recently notified EPA of its intent not to support the reregistration of carbon dioxide for this use. Therefore, the aerosol spray insecticide use has not been considered in this RED.

In 1982, carbon dioxide was registered for use as a fumigant to control insects and mites in stored grain. EPA exempted carbon dioxide from tolerance requirements on all agricultural commodities in 1980 (see 40 CFR 180.1049), and established a food additive tolerance for post-harvest use of carbon dioxide on all processed agricultural commodities in 1981 (see 40 CFR 185.650).

Human Health Assessment

Toxicity

All toxicology data requirements for the pesticide fumigant use of carbon dioxide have been satisfied, and no further studies are required for reregistration.

Acute inhalation toxicity studies show that exposure of test animals to atmospheres containing increasing concentrations of carbon dioxide causes increasingly severe effects on the heart, brain and nervous system, ultimately resulting in death.

Subchronic toxicity studies show reversible weight loss in test animals. A chronic toxicity study on brewery workers suggests that there are no significant physiological effects from chronic intermittent exposures to relatively low level carbon dioxide concentrations. Other chronic studies using test animals resulted in birth defects and adverse effects on sperm production.

Dietary Exposure

Carbon dioxide has been consumed in naturally carbonated "mineral" water for centuries, and in manufactured carbonated beverages for many years, without any indications of toxic effects. It is listed as a substance Generally Recognized as Safe, or GRAS, for use in food (please see 21 CFR 184.1240).

Carbon dioxide is used on fruits and vegetables after they are harvested to control insects during storage; this use is exempt from the requirement of a tolerance (please see 40 CFR 180.1049). Carbon dioxide also may be used on all processed agricultural commodities as a food additive for stored product insect control (please see 40 CFR 185.650).

Applicator Exposure

The indoor use of carbon dioxide products to fumigate stored raw and processed foods poses potential exposure risks for workers, especially when they must reenter confined, enclosed spaces. Carbon dioxide gas may collect in poorly ventilated depressions in grain bins, shafts, etc., and in sites where recirculation of air is minimal. Product labels will require air monitoring while treated areas are being ventilated to reduce ambient levels of carbon dioxide. Reentry of more than 15 minutes into treated areas will not be allowed until carbon dioxide levels fall below 10,000 ppm.

Human Risk Assessment

Many of the studies usually required for pesticide registration are not necessary for EPA to regulate carbon dioxide as a pesticide. People are

naturally exposed to carbon dioxide during normal respiratory and metabolic processes. We normally consume carbon dioxide in foods and beverages daily. The human body can rapidly compensate for moderate atmospheric increases of carbon dioxide.

Serious birth defects can result from acute exposure to atmospheres containing more than 10 percent carbon dioxide. However, applicators are not likely to encounter these levels if they use the fumigant products in accordance with approved labeling.

The only risk of concern associated with the pesticide fumigant use is the risk to workers who enter treated areas which have not been sufficiently ventilated. However, EPA believes that this risk is low if products are applied correctly and treated areas are ventilated properly, consistent with labeling.

Environmental Assessment

EPA is not requiring any environmental fate or ecological effects data on carbon dioxide. All the usual data requirements have been waived.

Environmental Fate

Carbon dioxide is a naturally occurring substance whose physical and chemical properties are well understood. Since it is used indoors to fumigate insects, EPA believes its use will not adversely effect the environment. Therefore, all environmental fate data requirements have been waived.

Ecological Effects

Since carbon dioxide is used indoors to control insects in stored food and feed, exposure to nontarget organisms is not expected. Therefore, no ecological effects data are required for reregistration.

Additional Data Required

The generic data base supporting reregistration of carbon dioxide is determined to be complete for reregistration. However, product-specific acute toxicity, efficacy and product chemistry data are being required.

Product Labeling Changes Required

End-use fumigant products containing carbon dioxide must bear several new, detailed label statements. Please see the RED for the exact language required. Briefly, new label statements are required in these areas:

- Human hazard precautionary statements;
- Spill and leak procedure statement;
- Placarding requirements;
- Storage and handling requirements.

Regulatory Conclusion

- All registered pesticide products containing carbon dioxide can be used without causing unreasonable adverse effects in people or the environment. Therefore, they are eligible for reregistration.
- The four end-use grain fumigant products containing carbon dioxide will be reregistered once product specific data and revised labeling are received and accepted by EPA.

For More Information

EPA is requesting public comments on the Reregistration Eligibility Document for carbon and carbon dioxide during a 60-day time period, as announced in a Notice of Availability published in the Federal Register. To obtain a copy of the RED or to submit written comments, please contact the Public Response and Program Resources Branch, Field Operations Division (7506C), Office of Pesticide Programs (OPP), US EPA, Washington, DC 20460, telephone 703-557-2805.

In the future, the RED will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-487-4650.

For more information about carbon dioxide, or about EPA's pesticide reregistration program, please contact the Special Review and Reregistration Division (7508W), OPP, US EPA, Washington, D.C. 20460, telephone 703-308-8000. For information about the reregistration of individual carbon dioxide products, please contact the Registration Division (7505C), OPP, US EPA, Washington, DC 20460, telephone 703-557-5447.

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticides Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, 24 hours a day, seven days a week, or Fax your inquiry to 806-743-3094.