VI. WORK PRACTICES

Many organotins, especially the halogenated alkyltins and aryltins, produce toxic effects by contact with or absorption through the skin. Skin contact with organotin compounds has been reported to cause dermatitis including delayed local effects [18,35,36, JM Peters, written communication, December 1975], and systemic effects [34,35], as discussed in Chapter III. The halogenated alkyltins and aryltins have also been shown to be eye irritants [JM Peters, written communication, December 1975, 38]. Therefore, when employees are working with organotin compounds that are hazardous to the skin or eyes, they must use protective clothing and equipment to prevent skin contact and appropriate eye protective devices (goggles or face shields) to reduce the possibility of eye irritation or injury.

Good industrial hygiene practice requires that all reasonable efforts be used to limit the possibility of any organotin contacting the skin or eyes. Whenever skin contact with an organotin occurs, prompt washing of the affected area with soap and water is necessary. When an organotin compound contacts the eyes, immediate flushing with copious amounts of water is required and should be continued for at least 15 minutes, followed by prompt attention by a physician to determine the need for further treatment. Whenever there is a possibility for contamination of the clothing by an organotin compound, extra clothing must be available for the employee's use.

Certain organotin dusts, such as triphenyltin hydroxide, which is sold commercially as the miticide Du-Ter, have been found from industrial

experience [170 (pp 61-62)] to present special problems in formulation and application. These compounds are skin irritants, and contact should be avoided and prevented by full-body protective clothing, consisting of protection for head, neck, and face, coveralls or the equivalent, and impervious gloves with gauntlets. An alternative method of preventing employee exposure to irritating organotin dusts that has been found practical in the user industries [170 (pp 61-62)] is to purchase the dust premeasured and packaged in soluble plastic bags, and to adjust batch sizes so that the soluble plastic bag and its contents can be added to the chosen liquid vehicle without exposing employees to the hazardous dust.

In the manufacture of various organotin stabilizers, catalysts, fungicides, miticides, molluscicides, and other products, the appropriate aryltin and alkyltin halides are used as intermediates [6]. These compounds are, in general, quite irritating to the skin.

In emergency operations or in operations in which the concentration of organotin compounds cannot easily be reduced below the TWA concentration limit, respiratory protection based upon the expected or estimated airborne concentration must be provided for use by employees. Respiratory protective devices must be maintained in good working condition and must be cleaned and routinely inspected after each use.

Gloves, aprons, goggles, face shields, and other personal protective devices must be clean and maintained in good condition. All personal protective equipment should be cleaned frequently, with inspection and replacement as necessary on a regular schedule. Employers are responsible for assuring that such equipment is stored in suitable, designated containers or locations when the equipment is not in use. The proper use

of protective clothing requires that all openings be closed and that garments fit snugly about the neck, wrists, and ankles whenever the wearer is in an exposure area. Clean work clothing should be put on before each work shift. At the end of the work shift, the employee should remove the soiled clothing and shower before putting on street clothing. Soiled clothing should be deposited in a designated container and appropriately laundered before reuse.

A supply of potable water must be available near all places where there is potential contact with organotins. A water supply may be provided by a free-running hose at low pressure, or by emergency showers. Soap should be available at emergency showers. Where contact with the eyes is likely, eyewash fountains or bottles should be provided.

In all industries which must handle organotins or organotin-containing substances, written instructions informing employees of the particular hazards of the organotins, the method of handling, procedures for cleaning up spilled material, personal protective equipment to be worn, and procedures for emergencies must be on file and available to employees. The employer must establish a program of instruction which will ensure that all potentially exposed employees are familiar with the procedures. The Material Safety Data Sheet described in Appendix III may be used as a guide for employers in providing the necessary information. The duties of employees involved in maintenance and repair activities pose special problems of potential contact and exposure, especially in work on enclosed systems or in operations involving ventilation-system repair and maintenance. The nature of this type of work increases the potential for exposure. Maintenance employees may not be sufficiently familiar with the

hazardous materials with which they are involved. Therefore, special supervisory control and work-practice precautions are required to prevent exposure of these employees.

VII. RESEARCH NEEDS FOR ORGANOTIN COMPOUNDS

Proper assessment of the toxicity of the organotins and evaluation of their potential hazard to the working population requires extensive animal and human studies. The following are aspects of epidemiologic and toxicologic research which are especially important.

Epidemiologic Studies

No published epidemiologic study on the organotin industry has been found. Retrospective and prospective studies are needed to supply information on the effects of occupational exposure by inhalation and by skin or eye contact.

Acute Animal Studies

No basic acute inhalation studies have been found for many of the organotin compounds currently in use. Acute dermal and eye irritation studies would also aid in evaluating the toxic effects of organotin compounds. Such investigations require only a short time to produce data and permit a rapid preliminary assessment of the local toxicity of the organotin compounds.

Chronic Animal Experiments

Chronic experiments have been performed with several organotin compounds. Additional studies in this area are needed to assess the toxic

effects of other organotin compounds, especially on the liver, kidneys, lungs, and CNS of various species. Studies should use an exposure schedule simulating occupational exposure and should involve routes of exposure which are likely to occur in occupational contact with the compounds (inhalation and percutaneous absorption). These results may provide an insight into human susceptibility to the organotins.

Studies of Carcinogenic, Mutagenic, and Teratogenic Effects

Preliminary screening tests have been performed to assess the carcinogenicity of triphenyltin hydroxide and the mutagenicity of triphenyltin acetate [108,110]. Screening tests should be extended to all compounds which are currently in use or may be used in the future. These tests should be considered as only a preliminary survey and should be followed by extensive chronic and multigeneration experiments to evaluate the carcinogenic and syngenetic actions of these compounds. Multigeneration studies are particularly important because, when properly designed and performed, they furnish information on all three types of nucleidophilic activities.

Biochemical Experiments on Animals

Cremer [85] and Bridges et al [86] have examined the metabolism of a few organotin compounds in rats. Tests should be extended to other organotin compounds to see whether the metabolic pathway is the same. The rates of degradation of the organotins in both the occupational environment and the human body should be established. An understanding of the

mechanisms underlying the metabolic degradation of the organotins could lead to identification of the site of action and of the mechanism of toxic effects. This might allow development of a definitive medical treatment for organotin intoxication.

Sampling and Analysis

Studies are needed to improve the accuracy, sensitivity, and precision of the recommended methods. Investigations of other sampling and analytical techniques are encouraged, especially with regard to development of an analytical approach which can identify individual compounds at the proposed action level.

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