

# Occupational Health Guideline for Pyrethrum

## INTRODUCTION

This guideline is intended as a source of information for employees, employers, physicians, industrial hygienists, and other occupational health professionals who may have a need for such information. It does not attempt to present all data; rather, it presents pertinent information and data in summary form.

## SUBSTANCE IDENTIFICATION

- **Formula:** The synonyms and molecular weights listed below correspond to the various components of pyrethrum whose formulas are listed here: 1)  $C_{21}H_{28}O_3$ ; 2)  $C_{22}H_{28}O_5$ ; 3)  $C_{20}H_{28}O_3$ ; 4)  $C_{21}H_{28}O_5$ ; 5)  $C_{21}H_{30}O_3$ ; 6)  $C_{22}H_{30}O_5$
- **Synonyms:** 1) Pyrethrin I; 2) Pyrethrin II; 3) Cinerin I; 4) Cinerin II; 5) Jasmolin I; 6) Jasmolin II
- **Appearance and odor:** Viscous brown resin or solid.

## PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for pyrethrum is 5 milligrams of pyrethrum per cubic meter of air ( $mg/m^3$ ) averaged over an eight-hour work shift.

## HEALTH HAZARD INFORMATION

- **Routes of exposure**  
Pyrethrum can affect the body if it is inhaled or if it comes in contact with the eyes or skin. It can also affect the body if it is swallowed.
- **Effects of overexposure**  
The chief effect from exposure to pyrethrum is skin rash particularly on moist areas of the skin. The rash may be associated with intense itching and blister formation. Hay fever-like symptoms, wheezing, and breathing difficulties may occur from exposure to this chemical. An allergic reaction causing weakness and collapse may occur in sensitive individuals. Pyrethrum may irritate the eyes. In animals, effects of intoxication include convulsions and paralysis.

- **Reporting signs and symptoms:**

A physician should be contacted if anyone develops any signs or symptoms and suspects that they are caused by exposure to pyrethrum.

- **Recommended medical surveillance**

The following medical procedures should be made available to each employee who is exposed to pyrethrum at potentially hazardous levels:

*1. Initial Medical Screening:* Employees should be screened for history of certain medical conditions (listed below) which might place the employee at increased risk from pyrethrum exposure.

—Chronic respiratory disease: In persons with chronic respiratory disease and especially asthma, the inhalation of pyrethrum might cause exacerbation of symptoms due to its sensitizing properties.

—Skin disease: Pyrethrum can cause dermatitis which may be allergic in nature. Persons with pre-existing skin disorders may be more susceptible to the effects of this agent.

*2. Periodic Medical Examination:* Any employee developing the above-listed conditions should be referred for further medical examination.

- **Summary of toxicology**

Pyrethrum dust causes dermatitis and occasionally sensitization. In animals, effects of intoxication are excitation, convulsions, muscular fasciculations, and tetanic paralysis. The chief effect in humans from exposure to pyrethrum is dermatitis. The usual lesion is a mild erythematous dermatitis with vesicles, papules in moist areas, and intense pruritis; a bullous dermatitis may develop. In a study of workers engaged in processing pyrethrum powder, 30% had erythema, skin roughening, and pruritis which subsided upon cessation of exposure. One of these workers had an anaphylactic type reaction; shortly after entering a dust laden room, the facial skin turned red and the person felt a sensation of burning and itching; the cheeks and eyes rapidly became swollen and pruritis became severe; the entire condition disappeared in 2 days after removal from

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These recommendations reflect good industrial hygiene and medical surveillance practices and their implementation will assist in achieving an effective occupational health program. However, they may not be sufficient to achieve compliance with all requirements of OSHA regulations.

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exposure. Some persons exhibit sensitivity similar to pollinosis with sneezing, nasal discharge, and nasal stuffiness. A few cases of asthma due to pyrethrum mixtures have been reported; some of the individuals involved had a previous history of asthma with allergy to a wide spectrum of substances.

## CHEMICAL AND PHYSICAL PROPERTIES

### • Physical data

1. Molecular weight: 1) 328.4; 2) 372.4; 3) 316.4; 4) 360.4; 5) 330.4; 6) 374.4;
2. Boiling point (760 mm Hg): Not applicable
3. Specific gravity (water = 1): 1 (approximately)
4. Vapor density (air = 1 at boiling point of pyrethrum): Not applicable
5. Melting point: Data not available
6. Vapor pressure at 20 C (68 F): Essentially zero
7. Solubility in water, g/100 g water at 20 C (68 F):

Insoluble

8. Evaporation rate (butyl acetate = 1): Not applicable

### • Reactivity

1. Conditions contributing to instability: None.
2. Incompatibilities: Contact with strong oxidizers may cause fires and explosions.
3. Hazardous decomposition products: None.
4. Special precautions: None.

### • Flammability

1. Flash point: 82– 88 C (180– 190 F) (open cup)
2. Autoignition temperature: Data not available
3. Flammable limits in air, % by volume: Not applicable
4. Extinguishant: Carbon dioxide, foam, dry chemical

### • Warning properties

Since the vapor pressure of pyrethrum is essentially zero, warning properties are not considered.

Grant states that pyrethrum "is an insecticide powder which may cause allergic reaction and contact dermatitis. Transient conjunctival edema and hyperemia may be induced. The constituents pyrethrin I and II in pure form are said to be irritating to the eyes and mucous membranes. No persistent ocular disturbance from pyrethrum or its derivatives appears to have been reported."

## MONITORING AND MEASUREMENT PROCEDURES

### • General

Measurements to determine employee exposure are best taken so that the average eight-hour exposure is based on a single eight-hour sample or on two four-hour samples. Several short-time interval samples (up to 30 minutes) may also be used to determine the average exposure level. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee).

### • Method

An analytical method for pyrethrum is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 6, 1980, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00369-6).

• Gleason, M. N., Gosselin, R. E., Hodge, H. C., and Smith, R. P.: *Clinical Toxicology of Commercial Products* (3rd ed.), Williams and Wilkins, Baltimore, 1969.

## RESPIRATORS

• Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health.

• In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation.

## PERSONAL PROTECTIVE EQUIPMENT

• Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent skin contact with pyrethrum or liquids containing pyrethrum where skin contact may occur.

• If employees' clothing may have become contaminated with pyrethrum or liquids containing pyrethrum, employees should change into uncontaminated clothing before leaving the work premises.

• Clothing contaminated with pyrethrum should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of pyrethrum from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the pyrethrum, the person performing the operation should be informed of pyrethrum's hazardous properties.

• Non-impervious clothing which becomes contaminated with pyrethrum should be removed promptly and not reworn until the pyrethrum is removed from the clothing.

- Employees should be provided with and required to use dust- and splash-proof safety goggles where pyrethrum or liquids containing pyrethrum may contact the eyes.

## SANITATION

- Skin that becomes contaminated with pyrethrum should be promptly washed or showered with soap or mild detergent and water to remove any pyrethrum.
- Employees who handle pyrethrum or liquids containing pyrethrum should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities.

## COMMON OPERATIONS AND CONTROLS

The following list includes some common operations in which exposure to pyrethrum may occur and control methods which may be effective in each case:

Operation	Controls
Application as an insecticide on pre- and post-harvest agricultural crops; cattle and poultry, food cartons, and confined areas	Good personal hygiene
Manufacture of pyrethrum	Good personal hygiene
Formulation of scabicides and parasiticides for medical and veterinary use	Good personal hygiene

## EMERGENCY FIRST AID PROCEDURES

In the event of an emergency, institute first aid procedures and send for first aid or medical assistance.

### • Eye Exposure

If pyrethrum or liquids containing pyrethrum get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. If irritation is present after washing, get medical attention. Contact lenses should not be worn when working with this chemical.

### • Skin Exposure

If pyrethrum or liquids containing pyrethrum get on the skin, immediately wash the contaminated skin using soap or mild detergent and water. If pyrethrum or liquids containing pyrethrum penetrate through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. If irritation is present after washing, get medical attention.

### • Breathing

If a person breathes in large amounts of pyrethrum, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration.

Keep the affected person warm and at rest. Get medical attention as soon as possible.

### • Swallowing

When pyrethrum or liquids containing pyrethrum have been swallowed and the person is conscious, give the person large quantities of water immediately. After the water has been swallowed, try to get the person to vomit by having him touch the back of his throat with his finger. Do not make an unconscious person vomit. Get medical attention immediately.

### • Rescue

Move the affected person from the hazardous exposure. If the exposed person has been overcome, notify someone else and put into effect the established emergency rescue procedures. Do not become a casualty. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

## SPILL AND DISPOSAL PROCEDURES

- Persons not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed.

- If pyrethrum is spilled, the following steps should be taken:

1. Ventilate area of spill.
2. For small quantities, sweep onto paper or other suitable material, place in an appropriate container and burn in a safe place (such as a fume hood). Large quantities may be reclaimed; however, if this is not practical, dissolve in a flammable solvent (such as alcohol) and atomize in a suitable combustion chamber.

- Waste disposal methods:

Pyrethrum may be disposed of:

1. By making packages of pyrethrum in paper or other flammable material and burning in a suitable combustion chamber.
2. By dissolving pyrethrum in a flammable solvent (such as alcohol) and atomizing in a suitable combustion chamber.

## REFERENCES

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## RESPIRATORY PROTECTION FOR PYRETHRUM

Condition	Minimum Respiratory Protection* Required Above 5 mg/m <sup>3</sup>
Particulate Concentration	
50 mg/m <sup>3</sup> or less	Any chemical cartridge respirator with an organic vapor cartridge(s) and dust, fume, and mist filter(s), including pesticide respirators which meet the requirements of this class.  Any supplied-air respirator.  Any self-contained breathing apparatus.
250 mg/m <sup>3</sup> or less	A chemical cartridge respirator with a full facepiece, organic vapor cartridge(s), and dust, fume, and mist filter(s), including pesticide respirators which meet the requirements of this class.  Any supplied-air respirator with a full facepiece, helmet, or hood.  Any self-contained breathing apparatus with a full facepiece.
5000 mg/m <sup>3</sup> or less	A powered air-purifying respirator with an organic vapor cartridge and high efficiency particulate filter, including pesticide respirators which meet the requirements of this class.  A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 5000 mg/m <sup>3</sup> ** or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.  A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Fire Fighting	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
Escape	Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class.  Any escape self-contained breathing apparatus.

\*Only NIOSH-approved or MSHA-approved equipment should be used.

\*\*Use of supplied-air suits may be necessary to prevent skin contact while providing respiratory protection from airborne concentrations of pyrethrum; however, this equipment should be selected, used, and maintained under the immediate supervision of trained personnel. Where supplied-air suits are used above a concentration of 5000 mg/m<sup>3</sup>, an auxiliary self-contained breathing apparatus operated in positive pressure mode should also be worn.