

Occupational Health Guideline for Pival

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: $C_{14}H_{14}O_3$
- Synonyms: 2-Pivalyl-1,3-indandione; pivalyl; tert-butyl-valone; 2-pivaloyl-1,3-indandione; 1,3-dioxo-2-pivaloylindane; pindone
- Appearance and odor: The technical material, which is a 0.5% concentrate in an inert solid, is a bright yellow solid with almost no odor.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for Pival is 0.1 milligram of Pival per cubic meter of air (mg/m^3) averaged over an eight-hour work shift.

HEALTH HAZARD INFORMATION

• Routes of exposure

Pival may be absorbed by swallowing, or indirectly by inhalation, and is probably not significantly absorbed through the skin.

• Effects of overexposure

Pival causes no immediate symptoms. Swallowing Pival, particularly in repeated smaller doses, may cause generalized bleeding, such as nose bleeds, excessive bleeding of minor cuts, smoky urine, or black, tarry stools. A person may experience stomach and back pain one to several days after being exposed to Pival.

• 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 Pival.

• Recommended medical surveillance

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

1. Initial Medical Examination:

—A complete history and physical examination, including a complete blood count: The effects of overexposure from Pival can be enhanced or mimicked in individuals who have blood disorders with bleeding tendencies or with diseases that cause internal bleeding, such as peptic ulcer. Also, those with chronic liver disease may be increased risk, as are those on therapeutic doses of anticoagulants.

—Prothrombin time: The principal action of Pival is to reduce the level of prothrombin, prolonging the prothrombin time. This test is critical to the monitoring of exposed employees.

2. Periodic Medical Examination: At three months from the first exposure and annually thereafter, the employer should make available to the employee medical procedures listed under the preplacement examination. Also, if an employee develops signs or symptoms associated with Pival exposure at any time during employment, the employer should provide medical examinations to the employee.

• Summary of toxicology

Pival is a vitamin K antagonist, inhibiting prothrombin formation. Since repeated doses have a cumulative effect, a toxic concentration may be reached after several days of exposure to small doses. In rats, the ingestion of a single large dose of Pival causes rapid death due to pulmonary and visceral congestion without hemorrhage and may not be related to vitamin K antagonism. Death in animals from chronic exposure is due to multiple internal hemorrhage.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data

1. Molecular weight: 230
2. Boiling point (760 mm Hg): Data not available

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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Public Health Service Centers for Disease Control
National Institute for Occupational Safety and Health

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Occupational Safety and Health Administration

- 3. Specific gravity (water = 1): 1.06
- 4. Vapor density (air = 1 at boiling point of Pival):

Data not available

- 5. Melting point: 110 C (230 F)
- 6. Vapor pressure at 20 C (68 F): Data not available
- 7. Solubility in water, g/100 g water at 20 C (68 F):

0.0018

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

• **Reactivity**

- 1. Conditions contributing to instability: Very high temperatures
- 2. Incompatibilities: None known
- 3. Hazardous decomposition products: None known
- 4. Special precautions: None known

• **Flammability**

- 1. Not flammable

• **Warning properties**

Pival is not known to be an eye irritant.

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**

At the time of publication of this guideline, no measurement method for Pival had been published by NIOSH.

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

- If employees' clothing may have become contaminated with Pival, employees should change into uncontaminated clothing before leaving the work premises.
- Clothing contaminated with Pival should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of Pival from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the Pival, the person performing the operation should be informed of Pival's hazardous properties.

SANITATION

- Eating and smoking should not be permitted in areas where Pival is handled, processed, or stored.
- Employees who handle Pival should wash their hands thoroughly with soap or mild detergent and water before eating or smoking.

COMMON OPERATIONS AND CONTROLS

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

Operation	Controls
Liberation during mixing and packaging operations in pesticide formulations	Local exhaust ventilation; respiratory protective equipment; separation of food storage and eating area from work area
Liberation during mixing and blending of pesticide formulation with other materials (cereal bait, liquid, etc).	Local exhaust ventilation; respiratory protective equipment; separation of food storage and eating area from work area
Liberation during synthesis of substance; during use as an intermediate in pharmaceutical synthesis	Local exhaust ventilation; respiratory protective equipment; separation of food storage and eating area from work area
Liberation during container reclamation, process clean-up, etc.	Local exhaust ventilation; respiratory protective equipment; separation of food storage and eating area from work area

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 Pival gets into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention as soon as possible. Contact lenses should not be worn when working with this chemical.

- **Swallowing**

When Pival has been swallowed, get medical attention immediately. If medical attention is not immediately available, get the afflicted person to vomit by having him touch the back of his throat with his finger or by giving him syrup of ipecac as directed on the package. This non-prescription drug is available at most drug stores and drug counters and should be kept with emergency medical supplies in the workplace. Do not make an unconscious person vomit.

- **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 Pival 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 equipped with an appropriate effluent gas cleaning device.

- Waste disposal methods:

Pival may be disposed of:

1. By making packages of Pival in paper or other flammable material and burning in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

2. By dissolving Pival in a flammable solvent (such as alcohol) and atomizing in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device.

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RESPIRATORY PROTECTION FOR PIVAL

Condition	Minimum Respiratory Protection* Required Above 0.1 mg/m ³
Particulate Concentration	
0.5 mg/m ³ or less	Any dust and mist respirator, except single-use respirators.
1 mg/m ³ or less	Any dust and mist respirator, except single-use or quarter-mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.
5 mg/m ³ or less	Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece. Any high efficiency particulate filter respirator with a full facepiece.
100 mg/m ³ or less	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
200 mg/m ³ or less	A Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode.
Greater than 200 mg/m ³ 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 dust and mist respirator, except single-use respirators. Any escape self-contained breathing apparatus.

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