

Occupational Health Guideline for sec-Amyl Acetate

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: $\text{CH}_3\text{COOCH}(\text{CH}_3)(\text{CH}_2)_2\text{CH}_3$
- Synonyms: 2-Pentanol acetate
- Appearance and odor: Clear, colorless liquid with a fruity odor.

PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for sec-amyl acetate is 125 parts of sec-amyl acetate per million parts of air (ppm) averaged over an eight-hour work shift. This may also be expressed as 650 milligrams of sec-amyl acetate per cubic meter of air (mg/m^3).

HEALTH HAZARD INFORMATION

• Routes of exposure

sec-Amyl acetate can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed.

• Effects of overexposure

1. *Short-term Exposure:* Overexposure to sec-amyl acetate may cause irritation of the eyes, nose, and throat. Overexposure may also cause headache, drowsiness, and unconsciousness.

2. *Long-term Exposure:* Prolonged overexposure may cause irritation of the skin.

3. *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 sec-amyl acetate.

• Recommended medical surveillance

The following medical procedures should be made available to each employee who is exposed to sec-amyl acetate 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 sec-amyl acetate exposure.

—Kidney disease: Although sec-amyl acetate is not known as a kidney toxin in humans, the importance of this organ in the elimination of toxic substances justifies special consideration in those with impaired renal function.

—Chronic respiratory disease: In persons with impaired pulmonary function, especially those with obstructive airway diseases, the breathing of sec-amyl acetate might cause exacerbation of symptoms due to its irritant properties.

—Liver disease: Although sec-amyl acetate is not known as a liver toxin in humans, the importance of this organ in the biotransformation and detoxification of foreign substances should be considered before exposing persons with impaired liver function.

—Skin disease: sec-Amyl acetate is a defatting agent and can cause dermatitis on prolonged exposure. 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

Irritation of the eyes and upper respiratory tract is the first response to exposure to the vapor in humans and may occur at concentrations above 300 ppm. At very high concentrations there may be depression of the central nervous system; narcosis occurred in guinea pigs at 5000 ppm, but not at 2000 ppm. These animals showed injury to the lungs, liver, and kidneys. This substance is a defatting agent, and prolonged exposure

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.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service Centers for Disease Control
National Institute for Occupational Safety and Health

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

may cause irritation of the skin. No chronic systemic effects have been reported in humans.

CHEMICAL AND PHYSICAL PROPERTIES

• Physical data

1. Molecular weight: 130
2. Boiling point (760 mm Hg): 134 C (273 F)
3. Specific gravity (water = 1): 0.9
4. Vapor density (air = 1 at boiling point of sec-amyl acetate): 4.5
5. Melting point: -100 C (-148 F) (estimated)
6. Vapor pressure at 20 C (68 F): 7 mm Hg (estimated)
7. Solubility in water, g/100 g water at 20 C (68 F): 0.2
8. Evaporation rate (butyl acetate = 1): 0.9

• Reactivity

1. Conditions contributing to instability: Heat
2. Incompatibilities: Contact with nitrates, strong oxidizers, strong alkalis, and strong acids may cause fires and explosions.
3. Hazardous decomposition products: Toxic gases and vapors (such as carbon monoxide) may be released in a fire involving sec-amyl acetate.
4. Special precautions: sec-Amyl acetate may soften or dissolve plastics.

• Flammability

1. Flash point: 31.7 C (89 F) (closed cup)
2. Autoignition temperature: Data not available
3. Flammable limits in air, % by volume: Lower: 1.0 (estimated)
4. Extinguishant: Dry chemical, foam, carbon dioxide

• Warning properties

1. Odor Threshold: By analogy to n-amyl acetate, which has an odor threshold of 0.082 ppm (May), the odor threshold of sec-amyl acetate is assumed to be below the permissible exposure limit.
2. Eye Irritation Level: According to the *Handbook of Organic Industrial Solvents*, sec-amyl acetate produces a response similar to that produced by the commercial grade. Amyl acetate (commercial) causes noticeable throat irritation "below (the) threshold limit, becoming severe as this level is reached. Eye and nose irritation indicates presence of threshold concentration."
3. Evaluation of Warning Properties: Since the odor threshold of sec-amyl acetate is assumed to be below the permissible exposure limit, it is treated as a material with good warning properties.

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

Sampling and analyses may be performed by collection of sec-amyl acetate vapors using an adsorption tube with subsequent desorption with carbon disulfide and gas chromatographic analysis. Also, detector tubes certified by NIOSH under 42 CFR Part 84 or other direct-reading devices calibrated to measure sec-amyl acetate may be used. An analytical method for sec-amyl acetate is in the *NIOSH Manual of Analytical Methods*, 2nd Ed., Vol. 2, 1977, available from the Government Printing Office, Washington, D.C. 20402 (GPO No. 017-033-00260-6).

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 repeated or prolonged skin contact with liquid sec-amyl acetate.
- Clothing wet with liquid sec-amyl acetate should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of sec-amyl acetate from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the sec-amyl acetate, the person performing the operation should be informed of sec-amyl acetate's hazardous properties.
- Any clothing which becomes wet with liquid sec-amyl acetate should be removed immediately and not

reworn until the sec-amyl acetate is removed from the clothing.

- Employees should be provided with and required to use splash-proof safety goggles where liquid sec-amyl acetate may contact the eyes.

SANITATION

- Skin that becomes wet with liquid sec-amyl acetate should be promptly washed or showered with soap or mild detergent and water to remove any sec-amyl acetate.

COMMON OPERATIONS AND CONTROLS

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

Operation	Controls
Use and liberation during spray application of lacquers, varnishes, enamels, and metallic paints	Local exhaust ventilation; personal protective equipment
Use and liberation during hand and dip applications of lacquers, varnishes, enamels, and metallic paints	Local exhaust ventilation; general dilution ventilation; personal protective equipment
Liberation during use of textile-sizing and printing compounds; during use of leather finishes	Local exhaust ventilation; general dilution ventilation; personal protective equipment
Use as a solvent for chlorinated rubber	General dilution ventilation; personal protective equipment
Use in manufacture of lacquers, varnishes, enamels, and metallic paints	Local exhaust ventilation; general dilution ventilation; personal protective equipment
Liberation during repair of motion picture film	General dilution ventilation
Use in preparation of specialty products, including nail polishes, fine perfumes, and pearlescent coatings	General dilution ventilation; personal protective equipment
Liberation during build-up of pearlescent coatings on artificial pearls	General dilution ventilation

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 sec-amyl acetate 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.

• Skin Exposure

If sec-amyl acetate gets on the skin, promptly flush the contaminated skin with water. If sec-amyl acetate soaks through the clothing, remove the clothing immediately and flush the skin with water. If there is skin irritation, get medical attention.

• Breathing

If a person breathes in large amounts of sec-amyl acetate, 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 sec-amyl acetate 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, LEAK, AND DISPOSAL PROCEDURES

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

• If sec-amyl acetate is spilled or leaked, the following steps should be taken:

1. Remove all ignition sources.
2. Ventilate area of spill or leak.
3. For small quantities, absorb on paper towels. Evaporate in a safe place (such as a fume hood). Allow sufficient time for evaporating vapors to completely clear the hood ductwork. Burn the paper in a suitable location away from combustible materials. Large quantities can be collected and atomized in a suitable combustion chamber. sec-Amyl acetate should not be al

lowed to enter a confined space, such as a sewer, because of the possibility of an explosion.

• Waste disposal methods:

sec-Amyl acetate may be disposed of:

1. By absorbing it in vermiculite, dry sand, earth or a similar material and disposing in a secured sanitary landfill.
2. By atomizing in a suitable combustion chamber.

REFERENCES

- American Conference of Governmental Industrial Hygienists: "sec-Amyl Acetate," *Documentation of the Threshold Limit Values for Substances in Workroom Air* (3rd ed., 2nd printing), Cincinnati, 1974.
- American Industrial Hygiene Association: "Amyl Acetate," *Hygienic Guide Series*, Detroit, Michigan, 1965.
- Browning, E.: *Toxicity and Metabolism of Industrial Solvents*, Elsevier, New York, 1965.
- Grant, W. M.: *Toxicology of the Eye* (2nd ed.), C. C. Thomas, Springfield, Illinois, 1974.
- *Handbook of Organic Industrial Solvents*, Technical Guide No. 6 (4th ed.), American Mutual Insurance Alliance, Chicago, 1972.
- May, J.: "Solvent Odor Thresholds for the Evaluation of Solvent Odors in the Atmosphere," *Staub-Reinhalt*, 26:9, 385-389, 1966.
- Patty, F. A. (ed.): *Toxicology*, Vol. II of *Industrial Hygiene and Toxicology* (2nd ed. rev.), Interscience, New York, 1963.
- Sax, N. I.: *Dangerous Properties of Industrial Materials* (3rd ed.), Van Nostrand Reinhold, New York, 1968.

RESPIRATORY PROTECTION FOR SEC-AMYL ACETATE

Condition	Minimum Respiratory Protection* Required Above 125 ppm
Vapor Concentration	
1000 ppm or less	A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s).
5000 ppm or less	A gas mask with a chin-style or a front- or back-mounted organic vapor canister. Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
9000 ppm 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 9000 ppm 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. Any escape self-contained breathing apparatus.

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

