

# Occupational Health Guideline for n-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:  $\text{CH}_3\text{COOC}_5\text{H}_{11}$
- Synonyms: 1-Pentanol acetate; n-amyl acetate (mixed isomers)
- Appearance and odor: Colorless liquid with a banana oil odor.

## PERMISSIBLE EXPOSURE LIMIT (PEL)

The current OSHA standard for n-amyl acetate is 100 parts of n-amyl acetate per million parts of air (ppm) averaged over an eight-hour work shift. This may also be expressed as 525 milligrams of n-amyl acetate per cubic meter of air ( $\text{mg}/\text{m}^3$ ).

## HEALTH HAZARD INFORMATION

- Routes of exposure  
n-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 n-amyl acetate may cause irritation of the eyes, nose, and throat. Severe overexposure may cause weakness, drowsiness, and unconsciousness.
  2. *Long-term Exposure:* Prolonged overexposure to n-amyl acetate may produce 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 n-amyl acetate.

- Recommended medical surveillance

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

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

—Liver disease: Although n-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.

—Kidney disease: Although n-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.

—Skin disease: n-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 upper respiratory tract and the eyes is the first response to exposure to n-amyl acetate vapor. 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 kidney. This substance is a defatting agent, and prolonged exposure may cause irritation of the skin. No chronic systemic effects have been reported in humans.

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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.

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

## CHEMICAL AND PHYSICAL PROPERTIES

### • Physical data

1. Molecular weight: 130
2. Boiling point (760 mm Hg): 146 C (295 F)
3. Specific gravity (water = 1): 0.88
4. Vapor density (air = 1 at boiling point of n-amyl acetate): 4.5
5. Melting point: -70.8 C (-95.4 F)
6. Vapor pressure at 20 C (68 F): 4 mm Hg
7. Solubility in water, g/100 g water at 20 C (68 F):

0.2

8. Evaporation rate (butyl acetate = 1): 0.42

### • Reactivity

1. Conditions contributing to instability: Heat
2. Incompatibilities: Contact with nitrates, strong oxidizers, strong alkalis, or 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 n-amyl acetate.

4. Special precautions: n-Amyl acetate will attack some forms of plastics, rubber, and coatings.

### • Flammability

1. Flash point: 25 C (77 F) (closed cup)
2. Autoignition temperature: 360 C (680 F)
3. Flammable limits in air, % by volume: Lower: 1.1; Upper: 7.5

4. Extinguishant: Alcohol foam, dry chemical, carbon dioxide

### • Warning properties

1. Odor Threshold: May reports an odor threshold for n-amyl acetate of 0.08 ppm.

2. Eye Irritation Level: Since the AIHA *Hygienic Guide* states that a "concentration of 200 ppm (amyl acetate) vapor caused mild eye and nose irritation in human subjects in 3 to 5 minutes," n-amyl acetate is treated as an eye irritant for the purposes of this guideline.

3. Evaluation of Warning Properties: Since the odor threshold of n-amyl acetate is well below the permissible exposure limit, n-amyl acetate 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 n-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 n-amyl acetate may be used. An analytical method for n-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 n-amyl acetate.

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

• Any clothing which becomes wet with liquid n-amyl acetate should be removed immediately and not reworn until the n-amyl acetate is removed from the clothing.

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

## SANITATION

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

## COMMON OPERATIONS AND CONTROLS

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

| Operation  | Controls  |
|--|---|
| Liberation during spray application of paints and lacquers   | Spray booths with proper ventilation; personal protective equipment |
| Liberation during coating application of textile finishing products  | Local exhaust ventilation; general dilution ventilation             |
| Liberation during brush and hand application of lacquers, lacquer thinners, paints, film cement, and general-purpose cellulose nitrate cements       | General dilution ventilation  |
| Use as a vehicle solvent during manufacture of cellulose nitrate lacquers, lacquer thinners, adhesives, nail enamel, nail enamel removers, and paint | General dilution ventilation  |
| Liberation of vapor during manufacture of textile finishing compounds  | General dilution ventilation  |
| Use as an extractant of penicillin from fermentation broth during production of antibiotics  | General dilution ventilation  |
| Liberation during manufacture of quick-drying inks, metallic inks, and transfer inks   | General dilution ventilation  |
| Use as vehicle solvent during molding operations in manufacture of cellulose nitrate plastics, toys, eyeglass frames, combs, and novelties           | General dilution ventilation; local exhaust ventilation             |
| Liberation during manufacture of photographic film   | General dilution ventilation; local exhaust ventilation             |

| Operation   | Controls  |
|---|---|
| Liberation during manufacture of furniture polish, leather polish, and shoe polish    | General dilution ventilation                                |
| Use in pre-spotting and spotting department in dry cleaning industry                  | General dilution ventilation; personal protective equipment |
| Liberation during manufacture of artificial fruit-flavoring agents                    | General dilution ventilation                                |
| Use as a vehicle solvent of lacquer and stiffening agent in manufacture of straw hats | General dilution ventilation; local exhaust 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 n-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 n-amyl acetate gets on the skin, promptly flush the contaminated skin with water. If n-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 n-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 n-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 n-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. n-Amyl acetate should not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion.
- Waste disposal methods:

n-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

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## RESPIRATORY PROTECTION FOR N-AMYL ACETATE

| <b>Condition</b>  | <b>Minimum Respiratory Protection*<br/>Required Above 100 ppm</b>   |
|---|---|
| <b>Vapor Concentration</b>  |   |
| 1000 ppm or less  | A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s).  |
| 4000 ppm or less  | A gas mask with a chin-style or a front- or back-mounted organic vapor canister.<br>Any self-contained breathing apparatus with a full facepiece.<br>Any supplied-air respirator with a full facepiece, helmet, or hood.  |
| Greater than 4000 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.<br><br>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. |
| <b>Fire Fighting</b>  | Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.   |
| <b>Escape</b>   | Any gas mask providing protection against organic vapors.<br>Any escape self-contained breathing apparatus.   |

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

