Product Safety Assessment

UCAR™ n-Propyl Propionate
UCAR n-Butyl Propionate
UCAR n-Pentyl Propionate

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Names
- CAS No. 106-36-5
- EC No. 203-389-7
- UCAR™ n-propyl propionate
- Propyl propanoate
- Propionic acid, propyl ester
- CAS No. 590-01-2
- EC No. 209-669-5
- UCAR™ n-butyl propionate
- Butyl propanoate
- Propanoic acid, butyl ester
- CAS No. 624-54-4
- EC No. 210-852-7
- UCAR™ n-pentyl propionate
- n-Amyl propionate
- Propanoic acid, pentyl ester
- Pentyl propanoate

Product Overview
- The UCAR™ n-alkyl propionates family of products includes UCAR n-propyl propionate, UCAR n-butyl propionate, and UCAR n-pentyl propionate. These materials are not listed as Hazardous Air Pollutants (HAP) by the United States Environmental Protection Agency (U.S. EPA). They are clear, colorless liquids with a fruity odor. These products have excellent solvent properties due to their linear molecular structure.\(^1\)\(^2\) For further details, see Product Description.
- UCAR n-alkyl propionates are mainly used as solvents in high-solids coatings. Some examples are new and refinish automotive coatings and appliance coatings. UCAR n-alkyl propionates are also used in printing inks and as polymerization solvents for acrylic resins.\(^2\)\(^3\)\(^4\) For further details, see Product Uses.
- Eye contact with n-alkyl propionates may cause slight to moderate irritation. Prolonged skin contact with n-propyl- or n-butyl propionate may cause severe irritation or burns. Prolonged skin contact with n-pentyl propionate may cause irritation with local redness and discomfort. Excessive inhalation of these materials may result in adverse effects.\(^5\)\(^6\) For further details, see Health Information or Physical Hazard Information.
- Worker exposure to this material is possible during manufacturing or downstream formulation or painting/coating/printing operations. Engineering controls and personal protection equipment greatly reduce occupational exposure potential. UCAR n-alkyl propionates are not sold for direct consumer use. n-Propyl propionate and n-butyl propionate occur naturally in some fruits and other foods. They are approved by the U.S. Food and Drug Administration.
(USFDA) for use as flavoring agents (21 CFR Title 21, Part 172.515). For further details, see Exposure Potential.

- n-Propyl propionate liquid and vapor are flammable. n-Butyl- and n-pentyl propionate are combustible. All of these materials are vapor explosion hazards. Their vapor is heavier than air and can travel long distances and accumulate in low-lying areas, creating an explosion or flashback hazard. Minimize sources of ignition such as static build-up, heat, spark, or flame. Avoid contact with acids, strong bases, strong oxidizers, and strong reducing agents. For further details, see Physical Hazard Information.

- UCAR™ n-alkyl propionates are readily biodegradable, unlikely to accumulate in the food chain, and range from slightly toxic to moderately toxic to fish and other aquatic organisms on an acute basis. For further details, see Environmental information.

Manufacture of Product

- **Capacity** – DOW™ UCAR™ n-alkyl propionates are produced at facilities in the United States (Tennessee and Texas).

- **Process** – UCAR™ n-alkyl propionates are manufactured in a closed, continuous process. The reaction for the formation of n-propyl propionate is shown below.

\[
\text{CH}_3\text{CH}_2\text{C} = \text{O} + \text{HOCH}_2\text{CH}_2\text{CH}_3 \rightarrow \text{CH}_3\text{CH}_2\text{C} = \text{OCH}_2\text{CH}_2\text{CH}_3 + \text{H}_2\text{O}
\]

Propionic acid n-Propanol n-Propyl propionate Water

Product Description

The UCAR™ n-alkyl propionates family of products includes UCAR n-propyl propionate, UCAR n-buty1 propionate, and UCAR n-pentyl propionate. They are clear, colorless liquids with a fruity odor. Because they are linear molecules, n-alkyl propionates provide stronger solvency than traditional acetate esters, especially for high-solids coatings and printing-ink applications. Other attributes are: proper volatility, faster solvent diffusion rates, viscosity reduction, high electrical resistivity, and lower odor values than solvents of similar volatility.

These materials are not listed as Hazardous Air Pollutants (HAP) by the United States Environmental Protection Agency (U.S. EPA), demonstrating reduced ozone formation potential. UCAR n-alkyl propionates are not expected to contribute to lower-level smog formation.

Product Uses

UCAR™ n-alkyl propionates are mainly used as solvents in high-solids coatings formulations. Typical applications include:
- Automotive refinish coatings
- New vehicle coatings (OEM coatings)
- Appliance coatings
- Printing inks
- Polymerization solvent for the production of acrylic resins

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In addition to the above applications, n-butyl propionate is used as a solvent in enamels, lacquers, and cleaning fluid formulations. Additional solvent uses for n-pentyl propionate include cleaning fluids, personal-care products, cosmetics, fragrances, and pharmaceuticals.

UCAR™ n-alkyl propionates are not listed as Hazardous Air Pollutants (HAP) by the United States Environmental Protection Agency (U.S. EPA), making them excellent replacement solvents for oxo-hexyl acetate, methyl n-amyl ketone, and xylene.

Exposure Potential

UCAR™ n-alkyl propionates are used in the production of industrial and consumer products. Based on the uses for n-alkyl propionates, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in an n-alkyl propionate manufacturing facility or in the various industrial or manufacturing facilities that use these materials as a solvent. They are produced, distributed, and stored in closed systems. Those working with this material in manufacturing, downstream formulation or painting/coating/printing operations could be exposed during maintenance, sampling, testing, or other procedures. Each facility should have a thorough training program for employees and appropriate work processes, ventilation, and safety equipment in place to limit unnecessary exposure. See Health Information.

- **Consumer exposure to products containing n-propyl propionate, n-butyl propionate, or n-pentyl propionate** – UCAR n-alkyl propionates are not sold for direct consumer use. n-Propyl propionate occurs naturally in coffee, wine, rum, and many fruits such as bananas, apples, and grapes. It is used as a fruit flavoring ingredient and rum-flavoring agent for beverages, ice cream, ices, candy, and baked goods. n-Butyl propionate also occurs naturally in some fruits such as apples, bananas, grapes, strawberries, and raspberries. Both n-propyl- and n-butyl propionate are approved by the U.S. Food and Drug Administration for use as flavoring agents. n-Pentyl propionate is not a naturally occurring chemical. It may be present in personal-care products, cosmetics, or fragrances. Always read the product information before use and follow the label/use instructions. See Health Information.

- **Environmental releases** – n-Alkyl propionates are moderately volatile and only slightly soluble in water. Once introduced into water, a portion of the compounds will remain dissolved. Because these compounds are readily biodegradable, they will be removed by sewage treatment plants. In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. Eliminate all ignition sources. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, dike the area to contain the spill. If available, use foam to smother or suppress vapors. Ground and bond all containers and handling equipment. Pump recovered material with explosion-proof equipment. Collect in suitable and properly labeled containers. Warn the public of any downwind explosion hazard. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Evacuate personnel upwind, out of low areas. Vapors are heavier than air and can travel long distances. Ignition or flashback could occur. Eliminate ignition sources. Extinguish fires with water fog or fine spray, dry-chemical or carbon-dioxide extinguishers, or foam. Use of a direct water stream may spread the fire. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.
Health Information\textsuperscript{1,5,6}

Health information about each of the UCAR™ n-alkyl propionates is summarized on the relevant Safety Data Sheet. It is important to note that the health risks associated with individual products may vary. The Safety Data Sheet is the preferred source for specific health information; however, an overview for n-alkyl propionates is included below.

**Eye contact** – Eye contact with n-alkyl propionates may cause slight to moderate irritation. Eye contact with n-propyl propionate may cause slight temporary corneal injury.

**Skin contact** – Brief skin contact with these materials is essentially non-irritating. Prolonged skin contact with n-propyl propionate or n-butyl propionate may cause severe irritation or burn the skin. Symptoms may include pain, severe local redness, swelling, and tissue damage. Prolonged skin contact with n-alkyl propionates is unlikely to result in absorption of harmful amounts.

**Inhalation** – At room temperature, exposure to n-pentyl propionate vapor is minimal due to its low volatility. For n-propyl propionate and n-butyl propionate: prolonged excessive inhalation may cause adverse effects, including central nervous system depression. Symptoms of excessive exposure may be anesthetic or narcotic effects including dizziness or drowsiness.

**Ingestion** – Very low toxicity if swallowed. Harmful effects are not anticipated from swallowing small amounts.

**Repeated exposure** – In animals, prolonged over-exposure to n-propyl propionate and n-pentyl propionate has adversely affected the nasal tissue and over-exposure to n-butyl propionate may cause upper respiratory tract irritation. For more information, see the relevant Safety Data Sheet.

Environmental Information\textsuperscript{1,5,6}

**UCAR™ n-propyl propionate** – This material is moderately volatile and only slightly soluble in water. Once introduced to water, a portion of the compound will remain in water. It has minimal tendency to bind to soil or sediment. n-Propyl propionate is unlikely to persist in the environment. The compound is considered readily biodegradable, which suggests the chemical will be rapidly and completely removed from water and soil environments, including biological wastewater treatment plants. n-Propyl propionate is not likely to accumulate in the food chain (bioconcentration potential is low) and is slightly toxic to fish and other aquatic organisms on an acute basis.

**UCAR n-butyl propionate** – This material is moderately volatile and only slightly soluble in water. Once introduced to water, a portion of the compound will remain in water. It has minimal tendency to bind to soil or sediment. n-Butyl propionate is unlikely to persist in the environment. The compound is considered readily biodegradable, which suggests the chemical will be rapidly and completely removed from water and soil environments, including biological wastewater treatment plants. n-Butyl propionate is not likely to accumulate in the food chain (bioconcentration potential is low). It is moderately toxic to fish and other aquatic organisms on an acute basis.

**UCAR n-pentyl propionate** – This material is moderately volatile and poorly soluble in water. Once introduced to water, a portion of the compound will have a tendency to evaporate. It has minimal tendency to bind to soil or sediment. n-Pentyl propionate is unlikely to persist in the environment. The compound is considered readily biodegradable, which suggests the chemical will be rapidly and completely removed from water and soil environments, including biological

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wastewater treatment plants. n-Pentyl propionate is not likely to accumulate in the food chain (bioconcentration potential is low). It is slightly toxic to fish and other aquatic organisms on an acute basis.

For more information, see the relevant Safety Data Sheet.

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Physical Hazard Information

n-Propyl propionate liquid and vapor are flammable. n-Butyl- and n-pentyl propionate are combustible. All of these materials are vapor explosion hazards. Their vapor is heavier than air and can travel long distances and accumulate in low-lying areas, creating an explosion or flashback hazard. Minimize sources of ignition such as static build-up, heat, spark, or flame. These materials are thermally stable at typical storage and use temperatures. Exposure to elevated temperatures can cause n-alkyl propionates to decompose.

Avoid contact with acids, strong bases, strong oxidizers, and strong reducing agents.

For more information, see the relevant Safety Data Sheet.

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Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of UCAR™ n-alkyl propionates. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet, Technical Data Sheet, or Contact Us.

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Additional Information

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (http://www.dow.com/oxysolvents/contact/index.htm)
- UCAR n-Butyl Propionate, Technical Data Sheet, The Dow Chemical Company, Form No. 327-00036-0308 (http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_00f7/0901b803800f7f63.pdf?filepath=oxysolvents/pdfs/noreg/327-00036.pdf&fromPage=GetDoc)
Product Safety Assessment: UCAR™ n-Alkyl Propionates

- **Volatile organic content compliance**, The Dow Chemical Company, Form No. 110-01041-1207 (http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_00dd/0901b803800dd907.pdf?filepath=oxysolvents/pdfs/noreg/110-01141.pdf&fromPage=GetDoc)


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**References**

1. **UCAR™ n-Propyl Propionate, Safety Data For the US**, The Dow Chemical Company, ID No. 27466/1001
2. **UCAR n-Propyl Propionate**, Technical Data Sheet, The Dow Chemical Company, Form No. 327-00034-0308
3. **UCAR n-Butyl Propionate**, Technical Data Sheet, The Dow Chemical Company, Form No. 327-00036-0308
4. **UCAR n-Pentyl Propionate**, Technical Data Sheet, The Dow Chemical Company, Form No. 327-00035-0308
5. **UCAR n-Butyl Propionate, Safety Data For the US**, The Dow Chemical Company, ID No. 837/1001
6. **UCAR n-Pentyl Propionate, Safety Data For the US**, The Dow Chemical Company, ID No. 1697/1001
10. Estimates by The Dow Chemical Company.
NOTICES:

As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment is intended to give general information about the chemical (or categories of chemicals) addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

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