Product Safety Assessment

UCARSOL™ AP Solvents

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Product Overview

- UCARSOL™ AP solvents are advanced-performance gas-treating solvents designed to remove carbon dioxide (CO₂), hydrogen sulfide (H₂S), and/or carbonyl sulfide (COS) from natural and synthesis gas.¹ For further details, see Product Description or Product Uses.
- UCARSOL AP solvents should be used and stored in closed systems. Workplace exposure could occur at a manufacturing site or facilities using these solvents to manufacture or process other products. Consumer exposure to these products is unlikely because they are sold only for industrial use.²,³ For further details, see Exposure Potential.
- Prolonged skin contact is unlikely to result in absorption of toxic amounts. However, contact with these products can result in severe eye and skin burns and an allergic response. If the products are heated or an aerosol or mist is produced, inhalation may cause upper respiratory tract irritation. If swallowed, these products may cause burns of the mouth and throat and gastrointestinal irritation or ulceration.²,³ For further details, see Health Information.
- The components of UCARSOL AP solvents are biodegradable, unlikely to bioaccumulate in the food chain, and slightly to moderately toxic to fish and aquatic organisms.²,³ See Environmental Information.
- UCARSOL AP solvents are stable under recommended storage conditions. Avoid contact with acrylates, alcohols, aldehydes, ketones, nitrites, strong acids, and strong oxidizers, as well as metals such as aluminum, copper, copper alloys, zinc, and galvanized metals. UCARSOL AP solvents may react with halogenated organic compounds, resulting in temperature and/or pressure increases. UCARSOL AP solvents are corrosive when wet. Heating above 60°C (140°F) in the presence of aluminum can result in corrosion and generation of flammable hydrogen gas.²,³ For further details, see Physical Hazard Information.

Manufacture of Product

- Capacity – Dow Gas Treating Products and Services is a global leader in the supply of products to meet all hydrogen sulfide (H₂S), carbon dioxide (CO₂), and other acid-gas treating requirements. The raw materials for UCARSOL™ AP solvents are made in manufacturing operations in the United States.
Product Description

UCARSOL™ AP solvents are proprietary mixtures of colorless to yellow liquid tertiary amine compounds with an ammonia-like odor and represent a series of advanced-performance gas-treating solvents. These solvents are completely soluble in water.

Product Uses

UCARSOL™ AP solvents are designed to remove carbon dioxide (CO₂), hydrogen sulfide (H₂S), carbonyl sulfide (COS) and/or other acid gases during synthesis and natural gas processing.

- **Carbon dioxide removal** – UCARSOL AP solvents are available for energy-efficient bulk removal of carbon dioxide (CO₂) in synthesis gas and natural gas plants.
- **Hydrogen sulfide removal** – Some UCARSOL AP solvents are designed for selective, energy-efficient, bulk removal of hydrogen sulfide (H₂S) from natural gas and related gas streams.
- **Carbonyl sulfide removal** – Certain UCARSOL AP solvents are also useful for removing carbonyl sulfide and other acid gases from gas streams.

Exposure Potential

Based on the uses for UCARSOL™ AP solvents, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a manufacturing facility that produces UCARSOL AP solvents or in the various industrial or manufacturing facilities that use these solvents. They are produced, distributed, stored, and consumed in closed systems. Those working with UCARSOL AP solvents in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each facility involved in the manufacture and use of these products should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit unnecessary solvent exposure. See Health Information.

- **Consumer exposure to products containing UCARSOL AP solvents** – UCARSOL solvents are for industrial use only. Consumer contact is not likely. See Health Information.

- **Environmental releases** – The components in UCARSOL AP solvents are soluble in water and have low to moderate volatility. Once introduced to water, these chemicals will have a tendency to remain in water. Because the components are biodegradable, they will be removed by sewage treatment plants. In the event of a spill, evacuate the area. Only trained and properly protected personnel should be involved in clean-up operations. The focus is on containing the spill to prevent contamination of soil and surface or ground water. Eliminate all sources of ignition in the vicinity of the spill or released vapor to avoid fire or explosion. Ground and bond all containers and handling equipment. Absorb small spills with noncombustible materials such as sand, clay, and vermiculite. Collect recovered material in suitable and properly labeled containers. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, evacuate personnel to a location upwind of the spill and keep personnel out of low-lying areas. Ventilate the area. Contain and recover the spilled material if possible. Pump recovered material into suitable and properly labeled containers. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Use water fog or fine spray, dry-chemical or carbon-dioxide fire extinguishers, or foam. Alcohol-resistant foams are preferred. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Burning liquids may be extinguished by diluting with water, but use of a direct water stream may spread the fire. Violent steam generation or eruption may occur upon application.

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of direct water stream to hot liquids. Avoid contact with UCARSOL™ AP solvents during firefighting operations. If contact is likely, firefighters should wear chemical-resistant clothing in addition to SCBA. During a fire, smoke may contain the original material in addition to combustion products that may be toxic and/or irritating, such as nitrogen oxides, carbon monoxide, and carbon dioxide. Prevent material from entering soil, ditches, sewers, waterways, and/or groundwater. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

Health Information

Eye contact – Eye contact with these products may cause severe irritation with chemical burns and corneal injury, which may result in permanent impairment of vision, even blindness.

Skin contact – Prolonged skin contact with these products may cause moderate irritation with local redness. Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage. Contact may cause a more severe response if the skin is abraded (scratched or cut). These products may also cause a more severe response on covered skin (under clothing, gloves). However, prolonged skin contact is unlikely to result in absorption of toxic amounts. Skin contact may also cause an allergic response, especially to individuals who have had an allergic response to similar products.

Inhalation – At room temperature, exposure to vapor is minimal due to the low volatility of these products. However, if they are heated or an aerosol or mist is produced, concentrations may be attained that are sufficient to cause respiratory irritation, an allergic response, or asthma-like symptoms (coughing, difficult breathing, tightness in the chest).

Ingestion – These products have low toxicity if swallowed. However, swallowing this material may result in burns to the mouth and throat. Swallowing may cause gastrointestinal irritation or ulceration. Aspiration into the lungs may occur during ingestion or vomiting, causing tissue damage or lung injury.

Repeated exposure – In animal testing for one of the components, excessive exposure may cause neurological signs and symptoms.

Other – In animal studies, the major components of these products did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in the mother. In vitro and animal genetic toxicity studies have been negative. Do not use sodium nitrite or other nitrosating agents in formulations containing this product. Suspected cancer-causing nitrosamines could be formed.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

Environmental Information

The components used to produce UCARSOL™ AP solvents have low volatility and are soluble in water. When introduced to water, these chemicals will have a tendency to remain in water. Under environmental conditions, these chemicals will have a tendency to bind to soil or sediment.
The components used to produce UCARSOL™ AP solvents are unlikely to persist in the environment. The components are biodegradable, which suggests that they will be removed from water and soil environments, including biological wastewater treatment plants.

These solvents have a low potential to accumulate in the food chain and are slightly to moderately toxic to fish and other aquatic organisms on an acute basis.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

Physical Hazard Information

Store UCARSOL™ AP solvents in a dry place. UCARSOL AP solvents are corrosive when wet. These solvents are stable under normal storage and use conditions, but elevated temperatures can cause them to decompose. Decomposition products depend upon temperature, air supply, and the presence of other materials.

Avoid contact with acrylates, alcohols, aldehydes, ketones, nitrites, strong acids, and strong oxidizers. Avoid contact with copper, copper alloys, galvanized metals, or zinc. Heating above 60°C (140°F) in the presence of aluminum can result in corrosion and generation of flammable hydrogen gas. Avoid using organic absorbents such as ground corn cobs, sawdust, cellulose, or peat moss. UCARSOL AP solvents can react with halogenated organics, resulting in temperature and/or pressure increases.

Spills of these solvents on hot fibrous insulations may reduce the auto-ignition temperature, with the potential for spontaneous combustion.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of UCARSOL™ AP solvents. These regulations may vary by city, state, country, or geographic region. Information may be found by requesting the relevant Safety Data Sheet or Contact Us.
Additional Information

- Safety Data Sheet (request from the Dow Customer Information group at http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (www.oilandgas.dow.com/oilandgas/contact/ or www.dow.com/gastreating/contact/index.htm)
- Dow Oil and Gas: Seeing Beyond Chemicals to the Chemistry of Possibilities, The Dow Chemical Company, Form No. 812-00001-908 AMS, September 2008
- UCARSOL™ AP 802 Solvent for Bulk CO₂ Removal, Product Information, The Dow Chemical Company, Form No. 170-01437-0704, July 2004
- UCARSOL AP 804 and 806 Solvents for Bulk CO₂ Removal, Product Information, The Dow Chemical Company, Form No. 170-01428-0704, July 2004
- UCARSOL AP 810 Solvent for CO₂ Removal, Product Information, The Dow Chemical Company, Form No. 170-01436-0704, July 2004
- UCARSOL AP 814 Solvent for CO₂ Removal, Product Information, The Dow Chemical Company, Form No. 170-01437-0704, July 2004

For more business information about UCARSOL™ AP solvents, visit the Dow Oil and Gas web site at www.dowoilandgas.com.

References

1 Dow Gas Treating Products and Services, The Dow Chemical Company, Form No. 170-00250-703X AMS, July 2003, pages 6–9.
2 UCARSOL™ AP Solvent 804 Material Safety Data Sheet, The Dow Chemical Company
3 UCARSOL AP Solvent 810 Material Safety Data Sheet, The Dow Chemical Company
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