Product Safety Assessment

**DOW™ CS-Plus Solvent Additive**


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**Product Overview**
- DOW™ CS-Plus products are colorless liquid secondary amine compounds with an ammonia-like odor.\(^1\) For further details, see Product Description.
- DOW CS-Plus products are used as an additive for DOW CS-Plus gas-treating solvent. For further details, see Product Uses.
- DOW CS-Plus products should be used and stored in closed systems. Workplace exposure could occur at a manufacturing site or facilities using this material to process gas streams. Consumer exposure to DOW CS-Plus products is unlikely because it is sold only for industrial use. For further details, see Exposure Potential.
- Contact with DOW CS-Plus products can result in severe eye and skin burns. If swallowed, this material causes burns of the mouth and throat. It may be harmful if absorbed through the skin or if it enters the lungs.\(^1\) For further details, see Health Information.
- DOW CS-Plus products are readily biodegradable, and its bioconcentration potential is low. The potential for mobility in soil is very high. Because of its water solubility, this material would tend to accumulate in surface water, where it would degrade rapidly. DOW CS-Plus products are slightly toxic to aquatic organisms on an acute basis.\(^1\) For further details, see Environmental Information.
- DOW CS-Plus products are combustible liquid and vapor. It is stable under recommended storage conditions. Avoid contact with nitrates, strong acids, and strong oxidizers. It can react with halogenated organics, resulting in temperature and/or pressure increases. DOW CS-Plus products 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.\(^1\) For further details, see Physical Hazard Information.

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**Manufacture of Product**
- **Capacity** – Dow produces DOW™ CS-Plus products at sites in Texas, USA.

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Product Description
DOW™ CS-Plus products are colorless liquid secondary amine compounds with an ammonia-like odor. It is completely miscible in water. These products combine the chemical characteristics of both amines and alcohols so that it is capable of undergoing reactions typical of both alcohols and amines: forming quaternary amine salts, soaps, and esters.

Product Uses
DOW™ CS-Plus products are used as an additive for DOW CS-Plus gas-treating solvent, which is specifically designed for maximum CO₂ removal in gas-processing plants.

Exposure Potential
DOW™ CS-Plus products are used in the treatment of gas streams to remove H₂S and/or CO₂. Based on the uses for this material, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a facility that manufactures DOW CS-Plus products or facilities that use this material to process gas streams. It is produced, distributed, stored, and consumed in closed systems. Those working with this material in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing or gas-processing 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 DOW CS-Plus solvent additive** – This product is sold for industrial use only. Consumer exposure to DOW CS-Plus products is unlikely. See Health Information.

- **Environmental releases** – If spilled, this material would tend to accumulate in surface water because of its water solubility, where it will degrade rapidly. 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 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 the 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 release and keep personnel out of low areas. Ventilate the area. Contain 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** – Deny any unnecessary entry into the area and consider the use of unmanned hose holders. 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 of a direct water stream to hot liquids. Avoid contact with this material 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.

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Health Information

Eye Contact – Eye contact with this material may cause severe irritation with corneal injury, which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Skin Contact – Brief skin contact with this material may cause burns. Symptoms may include pain, severe local redness, swelling, and tissue damage. Prolonged or widespread skin contact may also result in absorption of harmful amounts.

Inhalation – At room temperature, exposure to vapor is minimal due to this material’s low volatility. However, vapor from heated material or mists may cause adverse effects.

Ingestion – This material has a low toxicity if swallowed. However, swallowing may result in burns of the mouth and throat, as well as gastrointestinal irritation or ulceration. Aspiration into the lungs may occur during ingestion or vomiting, causing tissue damage or lung injury.

Other – Exposure to this material did not cause birth defects or any other fetal effects in laboratory animals in standardized tests. In animal studies, this material has been shown to interfere with reproduction. In vitro genetic toxicity studies were 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.

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Environmental Information

DOW™ CS-Plus products are readily biodegradable, and its bioconcentration potential (tendency to accumulate in the food chain) is low. The potential for mobility in soil is very high. This material is slightly toxic to aquatic organisms on an acute basis.

Because of its water solubility, this material would tend to accumulate in surface water, where it will degrade rapidly. It would not persist in the environment and would be removed readily and rapidly in wastewater-treatment facilities.

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

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Physical Hazard Information

DOW™ CS-Plus products are combustible liquid and vapor. Minimize sources of ignition—such as static build-up, heat, spark, or flame—in the area of use.
Store DOW™ CS-Plus products in a dry place. This material is corrosive when wet. Do not store it in copper, copper alloys, zinc, or galvanized containers. Heating above 60°C (140°F) in the presence of aluminum can result in corrosion and generation of flammable hydrogen gas.

DOW CS-Plus products are stable under normal storage and use conditions, but elevated temperatures can cause it to decompose. Decomposition products depend upon temperature, air supply, and the presence of other materials. Avoid contact with nitrites, strong acids, and strong oxidizers. Avoid unintended contact with halogenated hydrocarbons. DOW CS-Plus products can react with halogenated organics, resulting in temperature and/or pressure increases.

Spills of DOW CS-Plus products on hot fibrous insulations may reduce the autoignition temperature, with the potential for spontaneous combustion.

Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on empty or nearly empty containers.

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 DOW™ CS-Plus products. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet.

Additional Information
- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (http://www.dow.com/assistance/dowcig.htm)

For more business information about DOW™ CS-Plus products, visit the Dow Oil and Gas web sites at http://www.dowoilandgas.com or http://www.dow.com/gastreating/index.htm.

References
1 DOW™ CS-Plus Solvent Additive Material Safety Data Sheet, 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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Form No. 233-00648-MM-0315X