



Product Stewardship Summary Vinyl Chloride Monomer

Disclaimer: This Product Stewardship Summary is intended to give general information about Vinyl Chloride. It is not intended to provide an in-depth discussion of all health and safety information about the product or to replace any required regulatory communications.

Summary

Vinyl Chloride Monomer (VCM) is a colorless, flammable, liquefied gas that is manufactured and used primarily as an intermediate in the production of polyvinyl chloride (PVC). PVC is a durable and stable polymer used in a wide range of construction, infrastructure, and commercial applications. VCM is subject to comprehensive regulatory oversight in the United States and globally.

VCM is a hazardous material, with the potential to cause chronic health effects associated with exposure. As a result, its manufacture, processing, distribution, and use are generally conducted under controlled industrial conditions designed to reduce potential exposures.

VCM is primarily used in enclosed or controlled systems for the production of PVC. Conversion of VCM to PVC reduces the potential for exposure to the monomer. PVC, under normal conditions of use, is a high molecular weight material that does not exhibit the same hazardous properties associated with VCM. Polymerization can occur; however, VCM will not spontaneously polymerize to PVC without an initiator.

OxyChem's Product Stewardship program for VCM is intended to support responsible product management and includes:

- Supporting compliance with applicable federal, state, and local regulatory requirements
- Implementing engineering controls, monitoring systems, and exposure management practices consistent with industry standards
- Promoting safe handling, storage, and transportation practices
- Monitoring regulatory developments, including TSCA risk evaluation and potential risk management actions, and incorporating applicable requirements into company practices

VCM is managed throughout its lifecycle using established health, safety, and environmental practices to support its responsible use as a key raw material in PVC production.

1. Chemical Identity

Name: Vinyl Chloride Monomer

Synonyms: VCM, Vinyl Chloride, Chloroethene, Chloroethylene

Chemical Abstracts Service (CAS) number: 75-01-4

Chemical Formula: C₂H₃Cl

Molecular Weight: 62.5

2. Production

Vinyl Chloride Monomer (VCM) is produced via an integrated, closed-loop chlorinated hydrocarbon process using ethylene and chlorine as primary feedstocks. Ethylene is derived from petrochemical sources, and chlorine is produced by electrolysis of brine.

In this process, ethylene is converted to vinyl chloride through an intermediate, ethylene dichloride (EDC, $C_2H_4Cl_2$). EDC is generated by two primary reactions:

- Direct chlorination: $C_2H_4 + Cl_2 \rightarrow C_2H_4Cl_2$
- Oxychlorination: $C_2H_4 + 2HCl + 1/2O_2 \rightarrow C_2H_4Cl_2 + H_2O$

The EDC intermediate is then thermally cracked at elevated temperature and pressure to produce VCM and hydrogen chloride (HCl): $C_2H_4Cl_2 \rightarrow C_2H_3Cl + HCl$

Hydrogen chloride generated in the cracking step is recovered and recycled to the oxychlorination unit, maintaining a closed-loop process that maximizes raw material efficiency and reduces process waste.

OxyChem is a leading manufacturer of VCM and operates production facilities in Deer Park, Texas; Ingleside, Texas; and La Porte, Texas.

3. Uses

Vinyl Chloride Monomer (VCM) is not sold for consumer use and is handled primarily in controlled industrial settings. Its primary use is as a chemical intermediate in the production of polyvinyl chloride (PVC) and related copolymers.

VCM is consumed during polymerization to form PVC and is present only at residual levels in finished PVC resin. The material is typically transferred, stored, and processed within engineered systems designed to minimize releases and occupational exposure.

The majority of VCM produced is used in the manufacture of PVC, either on-site or at downstream industrial facilities. OxyChem customers use VCM to produce PVC resin, which is subsequently fabricated into a wide range of industrial and commercial products.

4. Physical and Chemical Properties

Vinyl Chloride Monomer (VCM) is an extremely flammable gas that may form explosive mixtures with air (flammability limits: 3.6–33% by volume). Combustion may generate hazardous gases, including hydrogen chloride, carbon monoxide, and carbon dioxide.

VCM is stable under normal storage, handling, and transportation conditions. Spontaneous polymerization to polyvinyl chloride (PVC) is an exothermic reaction that requires a free radical initiator and will not occur without an initiator. VCM does not spontaneously polymerize under conditions typically encountered during storage or transportation.

Hazardous reactions may occur if VCM is exposed to incompatible materials or high-temperature conditions. Thermal decomposition at elevated temperatures may generate hazardous gases. Trace hydrogen chloride and moisture may contribute to corrosion of certain metals.

Suitable extinguishing media include dry chemical, foam, carbon dioxide, or water spray. Water spray may be used to cool fire-exposed containers.

5. Health Effects

Inhalation

Primary route of exposure. High vapor concentrations may cause central nervous system depression, including dizziness, drowsiness, headache, nausea, disorientation, and impaired coordination. Exposure to high concentrations may cause respiratory distress, irregular heartbeat, loss of consciousness, or death. High concentrations in confined or poorly ventilated areas may displace oxygen and create an asphyxiation hazard.

Eye and Skin Contact

Contact with escaping compressed gas or liquid may cause frostbite. High vapor concentrations may irritate the eyes; direct exposure may result in irritation or other adverse effects. Skin contact with cold liquid/gas may produce redness, blistering, or freezing injury.

Ingestion

Not expected to be a significant route of occupational exposure under normal use conditions, as vinyl chloride is a gas at ambient temperature.

Chronic Effects

Vinyl chloride is classified as a known human carcinogen and is also suspected of causing genetic defects based on mutagenicity classification. Prolonged occupational exposure has been associated with angiosarcoma of the liver and other liver cancers. Chronic exposure may also affect the nervous system and other target organs and has been linked to scleroderma-like skin changes, Raynaud's phenomenon, and bone effects (acroosteolysis) of the fingers.

Developmental / Reproductive Effects

Not classified as a reproductive or developmental toxicant. Available human data have not demonstrated a clear association. In animal studies, developmental effects have generally occurred only at exposure levels that also produced maternal toxicity.

Information is based on occupational exposure and is intended to support safe handling under normal industrial use conditions.

6. Environmental Effects

Vinyl chloride released to the environment is expected to partition predominantly to the atmosphere due to its high volatility.

If released to soil, vinyl chloride is expected to have high mobility and may leach to groundwater. Volatilization from soil surfaces is expected to be an important environmental fate process.

If released to water, vinyl chloride is not expected to significantly adsorb to suspended solids or sediments. Volatilization from water surfaces is expected to be a dominant environmental fate process. Biodegradation may occur under aerobic and anaerobic conditions; however, the rate of degradation will vary depending

on environmental conditions. Vinyl chloride is not expected to significantly bioconcentrate in aquatic organisms.

If released into the air, vinyl chloride will exist primarily as a gas in the ambient atmosphere. It is degraded by reaction with photochemically generated hydroxyl radicals, with an estimated atmospheric half-life of approximately 1–2 days.

7. Exposure Pathways

The potential exposure pathways include:

- Worker Exposure - may occur in manufacturing and industrial settings where VCM is produced, processed, or handled. Exposure may occur by:
 - Inhalation of vapors, which is the primary route of exposure
 - Skin and eye contact during handling activities

VCM is handled in closed systems in manufacturing processes to minimize exposure; however, exposure may occur during non-routine activities such as maintenance, sampling, equipment opening, or other process operations. Occupational exposure is regulated under the U.S. Occupational Safety and Health Administration (OSHA) Vinyl Chloride Standard (29 CFR 1910.1017), which establishes requirements for exposure monitoring, engineering and work practice controls, personal protective equipment, medical surveillance, and training.

- Occupational Non-Users (ONUs) – are other personnel in industrial settings (e.g., contractors, maintenance workers, or adjacent workers) may experience indirect exposure in areas where VCM is present or handled. Exposure may occur through:
 - Inhalation of fugitive emissions
 - Contact during nearby operations or non-routine activities
- Environmental Releases and General Population Exposure – may occur to the general population from releases to air, water, or soil during manufacturing, processing, or handling operations. Potential exposure pathways include:
 - Inhalation of ambient air near industrial sources
 - Exposure via environmental media following releases to air, water, or soil

Certain exposure pathways may be addressed under other regulatory programs (e.g., Clean Air Act, Clean Water Act). Appropriate response procedures and protective measures are implemented to minimize exposure in the event of a release.

VCM is not sold for direct use in consumer products. Direct consumer exposure is not expected under normal conditions of use.

8. Recommended Risk Management Measures

VCM is flammable and may react with certain materials of construction. In addition, personnel exposure should be controlled. Users should review the Safety Data Sheet (SDS) prior to use. Users in the U.S. are subject to the requirements of the Occupational Safety and Health Administration (OSHA) Vinyl Chloride Standard (29 CFR 1910.1017).

The following are risk management measures to address potential hazards:

- Areas where VCM is used should be designed and maintained to minimize fire and explosion hazards and should meet applicable National Fire Protection Association (NFPA) requirements for flammable gases. During transfers, equipment should be properly grounded and bonded to prevent the buildup of static electricity, which may create an ignition source.
- Work areas should be well ventilated to maintain vapor concentrations below applicable exposure limits and reduce the potential for accumulation of flammable vapors.
- The odor threshold of VCM is approximately 3,000 ppm, which is significantly higher than occupational exposure limits and is not adequate to provide warning of hazardous concentrations. Air monitoring should be conducted to evaluate VCM concentrations in the workplace. Where necessary, engineering controls, such as closed system handling, process containment, automated transfer systems, vapor recovery systems, or properly designed ventilation systems, should be used to maintain vapor concentrations below applicable exposure limits.
- Engineering controls, monitoring, and work practices should be used to maintain worker exposures below applicable exposure limits and should be implemented as part of an overall exposure control plan.
- Appropriate eye protection (such as chemical splash goggles or a face shield) should be worn to prevent eye contact.
- Protective clothing and gloves should be worn to prevent skin contact.
- Equipment used for VCM storage or processing should be constructed of compatible materials. Bulk storage containers are typically constructed of carbon steel or stainless steel under controlled, dry conditions. Based on incompatibility considerations, aluminum, copper, and copper alloys should not be used for wetted parts.
- Personnel involved with VCM operations should be properly trained in the safe handling and use of the material.

9. Regulatory Compliance Information

The following regulatory programs may apply to vinyl chloride (VCM). Additional federal, state, and local requirements may apply.

U.S. Environmental Protection Agency (EPA)

- **Clean Air Act (CAA)**
Vinyl chloride is listed as a Hazardous Air Pollutant (HAP) under Section 112(b) and is subject to applicable emission standards. Reference:
 - [40 CFR 61.01 – Lists of Hazardous Air Pollutants \[ecfr.gov\]](#)
- **Clean Air Act (CAA) – Vinyl Chloride NESHAP**
Vinyl chloride production and processing operations are subject to National Emission Standards for Hazardous Air Pollutants (NESHAP), which establish emission limits, monitoring, reporting, and recordkeeping requirements. Reference:
 - [40 CFR Part 61 Subpart F – National Emission Standard for Vinyl Chloride \[epa.gov\]](#)

- **Clean Water Act (CWA)**
EPA has established National Recommended Water Quality Criteria for vinyl chloride for protection of human health. Reference(s):
 - [EPA National Recommended Water Quality Criteria Tables](#)
 - [EPA Water Quality Criteria Overview \[epa.gov\]](#)

- **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**
Vinyl chloride is listed as a hazardous substance. Releases equal to or greater than reportable quantities must be reported. Reference(s):
 - [40 CFR 302.4 – Hazardous Substances and Reportable Quantities \[ecfr.gov\]](#)
 - [EPA CERCLA Hazardous Substances Defined \[epa.gov\]](#)

- **Emergency Planning and Community Right-to-Know Act (EPCRA)**
Vinyl chloride is subject to reporting under Section 313 (Toxics Release Inventory – TRI). Reference:
 - <https://www.epa.gov/toxics-release-inventory-tri-program/tri-listed-chemicals>

- **Resource Conservation and Recovery Act (RCRA)**
Vinyl chloride may be regulated as a hazardous waste under: Reference(s):
 - **Characteristic waste code:**
D043 (toxicity characteristic for vinyl chloride)
 - [40 CFR 261.24 – Toxicity Characteristic \[ecfr.gov\]](#)
 - **Listed waste codes associated with production:**
K019, K020 (EDC/VCM production wastes)
 - [40 CFR 261.32 – Hazardous Wastes from Specific Sources \[ecfr.gov\]](#)
 - **Unused commercial product:**
U248 (vinyl chloride monomer)
 - [40 CFR 261.33 – Discarded Commercial Chemical Products \[ecfr.gov\]](#)

- **Safe Drinking Water Act (SDWA)**
Maximum Contaminant Level (MCL): **0.002 mg/L (2 ppb)** Reference:
 - [40 CFR 141.61 – Maximum Contaminant Levels for Organic Contaminants \[ecfr.gov\]](#)

- **Toxic Substances Control Act (TSCA)**
Vinyl chloride has been designated for evaluation by the EPA under TSCA as a high-priority chemical substance and may be subject to additional risk management requirements relating to human health and the environment across its lifecycle. Reference:
 - [Risk Evaluation for Vinyl Chloride | US EPA](#)

U.S. Department of Transportation (DOT)

- **Hazardous Materials Regulations (HMR)**
Vinyl chloride is regulated as a hazardous material for transportation:
 - Proper Shipping Name: Vinyl chloride, stabilized
 - UN Number: **UN 1086**
 - Hazard Class: **2.1 (Flammable Gas)**
 - Reference: [49 CFR 172.101 – Hazardous Materials Table](#)

Food and Drug Administration (FDA)

- **Bottled Water Standard**
Maximum permissible level for vinyl chloride: **0.002 mg/L (0.002 ppm)**
 - Reference: [21 CFR 165.110 – Bottled Water \[ecfr.gov\]](#)

Occupational Safety and Health Administration (OSHA)

- **Vinyl Chloride Standard**
29 CFR 1910.1017 establishes requirements for exposure control, monitoring, medical surveillance, and training. Reference: [29 CFR 1910.1017 – Vinyl Chloride \(eCFR\) \[ecfr.gov\]](#)
- **Permissible Exposure Limits (PEL):**
 - 8-hour time-weighted average (TWA): **1 ppm**
 - 15-minute ceiling limit: **5 ppm**
 - Reference: [29 CFR 1910.1017 – Vinyl Chloride \[ecfr.gov\]](#)

10. Sources for Additional Information

Note: These resources reflect general industry practices and are provided for informational purposes only. Users are responsible for evaluating applicability to their specific operations and for complying with all applicable regulatory requirements.

For additional information on vinyl chloride monomer (VCM), refer to the following OxyChem resources:

- OxyChem Safety Data Sheet (SDS) web site: [SDS Search](#) for Vinyl Chloride Monomer

For additional information on vinyl chloride monomer (VCM), refer to the following industry resources:

- The Chlorine Institute – Vinyl Chloride Monomer (VCM) Tank Car and Cargo Tank Handling Manual
Provides guidance on the safe shipping, receiving, loading, unloading, and handling of vinyl chloride monomer in bulk transport systems, including rail tank cars and cargo tanks, as well as applicable regulatory considerations and industry practices.
- Industry Safe Handling Guidance for Vinyl Chloride Monomer (VCM)
Published technical literature and guidance documents include information on storage systems, materials of construction, transfer operations, and general safety considerations for the handling and transportation of VCM.

11. Contact Information:

For additional information on Vinyl Chloride Monomer (VCM), contact OxyChem Customer Service:

- **1-800-752-5151**

For emergency situations, contact the OxyChem Emergency Response Hotline:

- **1-800-733-3665**

12. Preparation Date: June 29, 2026

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