

HEALTH & ENVIRONMENTAL RESEARCH
Industrial Hygiene & Toxicology Laboratories

U36

GENERAL

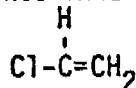
THE DOW CHEMICAL COMPANY

DATA SHEET OF PROPERTIES, HEALTH HAZARDS, AND PRECAUTIONS
FOR SAFE HANDLING OF MATERIALS

3.4-16 K-1711

MOLECULAR FORMULA	C_2H_3Cl	NAME	Vinyl chloride
MOLECULAR WEIGHT	62.50	INDUSTRIAL HYGIENE GUIDE	See below*
SYNONYMS	Chloroethene; Chloroethylene; VCM;		

STRUCTURAL FORMULA - OR COMPOSITION



NOTE: SEE DOW POSITION STATEMENT DATED 5/28/74
FOR OPERATIONAL GUIDELINES (ATTACHED).

PHYSICAL AND CHEMICAL PROPERTIES	BOILING POINT	EXPLOSIVE LIMITS (% VOL. IN AIR)	FLASH POINT	IGNITION TEMP.	MELTING POINT	VAPOR PRESS. mmHg. 25°C.
	-13.9°C 760 mmHg.	4-22	78°C	°F 472.2°C	-153.71 °C	29.433
	CORROSIVENESS (To Common Metals)			PHYSICAL STATE	COLOR	
	Not corrosive when dry			Gas	None	
	CHEMICAL REACTIVITY				ODOR (Include Concentration in Air)	
	Not dangerously reactive except for fire hazard				Sweet	
	STABILITY (To pH Change, Heat, Light)					
Will polymerize in presence of air, sunlight, oxygen or heat						

TOXIC PROPERTIES

TYPE OF CONTACT		CLASSIFICATION OF TOXIC PROPERTIES			
** EYE	☐	MAY CAUSE NO RESPONSE OR NO MORE THAN VERY SLIGHT TO SLIGHT TRANSITORY PAIN AND OR SLIGHT TRANSIENT CORNEAL INJURY AND OR IRRITATION OF THE EYELIDS.	☐	MAY CAUSE SOME PERMANENT LOSS OF VISION (THIS INCLUDES DAMAGE TO CORNEA OR INTERNAL INJURY WHICH IS INCOMPLETELY HEALED IN ONE WEEK.)	
	☒	MAY CAUSE SUFFICIENT INJURY TO THE EYE TO RESULT IN LOSS OF TIME FROM WORK. (THIS INCLUDES DAMAGE TO THE CORNEA WHICH HEALS OR NEARLY HEALS IN A WEEK AND/OR CONSIDERABLE CONJUNCTIVAL IRRITATION WITH EDEMA.)	☐	VAPOR EXPOSURE MAY CAUSE SEVERE PAIN, LACRYMATION OR SERIOUS INJURY TO THE EYES.	
** SKIN	☐	SINGLE PROLONGED EXPOSURE (HOURS) CAUSES NO EFFECT SEVERAL REPEATED PROLONGED EXPOSURES MAY OR MAY NOT CAUSE THE DEVELOPMENT OF SOME SLIGHT IRRITATION.	☐	SINGLE SHORT EXPOSURE (MINUTES) MAY CAUSE CONSIDERABLE IRRITATION AND OR SINGLE PROLONGED OR FREQUENTLY REPEATED SHORT EXPOSURES CAUSE A BURN AND OR MAY CAUSE SYSTEMIC INJURY, EVEN DEATH.	
	☒	SINGLE PROLONGED EXPOSURE MAY CAUSE SOME REDDENING OF THE SKIN. REPEATED PROLONGED CONTACTS MAY CAUSE APPRECIABLE IRRITATION, POSSIBLY A MILD BURN AND/OR MAY CAUSE APPRECIABLE SYSTEMIC INJURY DUE TO ABSORPTION.	☐	AN EXPOSURE RAPIDLY CAUSES SEVERE BURNS AND/OR SERIOUS SYSTEMIC INJURY, EVEN DEATH.	
INHALATION	DUST OR MIST	☐	NO SYSTEMIC INJURY EXPECTED. NO IRRITATION TO NOSE AND THROAT IN DUSTY OR MISTY ATMOSPHERES.	☐	DUSTY OR MISTY ATMOSPHERE PAINFUL TO NOSE AND THROAT (INTOLERABLE TO MOST PEOPLE) AND OR EXPOSURE MAY CAUSE SERIOUS SYSTEMIC INJURY, EVEN DEATH.
		☐	THROAT AND NOSE IRRITATION IN A DUSTY OR MISTY ATMOSPHERE IS PAINFUL BUT NOT INTOLERABLE AND/OR PROLONGED OR REPEATED EXPOSURES MAY CAUSE SYSTEMIC INJURY.	☐	SHORT EXPOSURE (MINUTES) MAY CAUSE DEATH OR SERIOUS SYSTEMIC INJURY.
	*** VAPOR Tested at room temperature unless otherwise indicated.	☐	EXPOSURES DO NOT CAUSE ANY EFFECTS OTHER THAN SOME VERY SLIGHT IRRITATION OR PAIN TO THE EYES OR RESPIRATORY PASSAGES AT THE MOST.	☐	EXPOSURES MAY CAUSE EXTREME DROWSINESS, AND OR SERIOUS SYSTEMIC INJURY, AND OR MAY CAUSE INTOLERABLE IRRITATION TO THE RESPIRATORY PASSAGES.
		☒	SINGLE EXPOSURES EXCEEDING 1/2 HOUR, OR FREQUENTLY REPEATED EXPOSURES OF SHORTER DURATION, MAY CAUSE SLIGHT ANESTHESIA AND/OR SLIGHT SYSTEMIC INJURY, AND/OR CAUSE APPRECIABLE, BUT NOT INTOLERABLE, IRRITATION OF RESPIRATORY PASSAGES.	☐	SHORT EXPOSURES MAY CAUSE UNCONSCIOUSNESS, AND/OR SERIOUS SYSTEMIC INJURY, INCLUDING DEATH.
		☐ EVEN VERY SHORT EXPOSURE WILL CAUSE SERIOUS SYSTEMIC INJURY OR DEATH.			
INGESTION	☒	AMOUNTS WHICH MAY BE SWALLOWED INCIDENTAL TO INDUSTRIAL HANDLING WILL NOT CAUSE INJURY. HOWEVER, IF SUBSTANTIAL QUANTITIES SHOULD BE SWALLOWED, MORE OR LESS SERIOUS EFFECTS MAY OCCUR.		☐	AMOUNTS WHICH MAY BE SWALLOWED INCIDENTAL TO INDUSTRIAL HANDLING AND USE MAY CAUSE SERIOUS INJURY.

COMMENTS

*Dow Industrial Hygiene Guide: 10 ppm TWA; OSHA Standard: 1 ppm TWA.

**Eye and skin contact may cause frostbite. Vinyl chloride liquid boils away rapidly enough to freeze tissue beneath it.

***Repeated exposures to high concentrations have caused cancer in the human subject.

Vinyl chloride

DEGREES OF EXPOSURE RELATED TO TYPES OF OPERATION		PRECAUTIONS (SEE CODE BELOW)				
		EYES	SKIN	INHALATION*		INGESTION
				DUST OR MIST	VAPOR	
NO CONTACT	CHARACTERIZED BY REMOTE OPERATION WITH EQUIPMENT ISOLATED FROM THE WORK AREA. THE PERSONS ENTERING ISOLATED AREAS WILL REQUIRE THE PERSONAL PROTECTION OUTLINED FOR IV BELOW.	A	A		A	A
MINOR CONTACT	CHARACTERIZED BY CLOSED SYSTEMS WITH EQUIPMENT VENTED OUTSIDE THE WORK AREA: INSTRUMENT CONTROL; MECHANICAL HANDLING OF MATERIALS IN BULK. EXAMPLES ARE: CONTINUOUS REACTORS, STILLS AND FILTERS, ENCLOSED CONVEYORS; VENTILATED PACKAGING.	B	A		D	A
OCCASIONAL DAILY CONTACT	CHARACTERIZED BY MANUAL HANDLING OF MATERIALS IN PACKAGES SUCH AS BAGS, DRUMS AND FIBERPACKS. VENTILATION MAY BE PROVIDED FOR SPECIFIC JOBS. MANY BATCH OPERATIONS FALL INTO THIS CATEGORY.	B	A		D	A
GROSS CONTACT LIKELY	CHARACTERIZED BY HAND OPERATION. EXAMPLES ARE: EMERGENCY REPAIRS, CLEANING EQUIPMENT, CLEANING FILTERS, TAKING CARE OF SPILLS, PACKAGING VOLATILE OR DUSTY MATERIALS WITHOUT VENTILATION, WHEELING AND TRAY DRYING.	D	A		D	A
EYE CONTACT	A NO EYE PROTECTION NEEDED.	D USE CHEMICAL WORKERS GOGGLES.				
	B USE SAFETY GLASSES WITHOUT SIDE SHIELDS.	E USE GAS TIGHT GOGGLES OR A FULL FACE GAS MASK.				
	C USE SAFETY GLASSES WITH SIDE SHIELDS.					
SKIN CONTACT	A A BATH AND CLEAN CLOTHES ONCE PER WEEK ALONG WITH THE USUAL WASHING AT MEALTIMES SHOULD BE ADEQUATE PRECAUTIONS.	CLOTHING SHOULD BE CHANGED AND SKIN WASHED PROMPTLY UPON ANY DETECTABLE CONTACT. EACH USE WILL REQUIRE SPECIAL CONSIDERATION TO DETERMINE SUITABLE PROTECTIVE DEVICES AND STANDARDS OF PERSONAL CLEANLINESS.				
	B GROSSLY CONTAMINATED CLOTHING AND SHOES MUST BE REMOVED NOT LATER THAN THE END OF THE WORK PERIOD AND MUST BE THOROUGHLY CLEANED BEFORE RE-USE.	IMPERVIOUS CLOTHING SUCH AS RUBBER BOOTS, RUBBER APRONS, AND RUBBER GLOVES WILL BE REQUIRED. SPECIFIC ITEMS WILL BE DICTATED AS REQUIRED BY CIRCUMSTANCE.				
	C REQUIRE SHOWER AT THE END OF THE WORK PERIOD AND CLEAN CLOTHING FROM THE SKIN OUT AT THE START OF EACH WORK DAY.					
INHALATION	DUST OR MIST	A NO RESPIRATORY PROTECTION.	ANY EXPOSURE TO OBVIOUSLY DUSTY ATMOSPHERES WILL REQUIRE A DUST RESPIRATOR BEARING THE APPROVAL OF THE U.S. BUREAU OF MINES FOR USE WITH TOXIC DUSTS.			
		B NO PROTECTION REQUIRED FOR EXPOSURE OF THIRTY MIN. DURATION OR LESS TO OBVIOUSLY DUSTY ATMOSPHERES. EXPOSURES OF LONGER DURATION WILL REQUIRE THE USE OF A DUST RESPIRATOR BEARING THE APPROVAL OF THE U.S. BUREAU OF MINES FOR THE USE WITH TOXIC DUSTS.	E ANY EXPOSURE TO DUSTY ATMOSPHERES WILL REQUIRE THE USE OF AN AIRLINE RESPIRATOR, BLOWER MASK, OR CHEMEX MASK.			
	VAPOR	A NO PRECAUTIONS NECESSARY.	NO PRECAUTIONS NECESSARY FOR SINGLE EXPOSURES OF NO MORE THAN TEN MINUTES. LONGER EXPOSURES EITHER SINGLE OR REPEATED, WILL REQUIRE GAS MASK OR RESPIRATOR EQUIPPED WITH APPROPRIATE CANISTER.			
		B NO PRECAUTIONS NECESSARY FOR SINGLE EXPOSURES OF LESS THAN 1/2 HOUR. LONGER SINGLE EXPOSURES, OR FREQUENTLY REPEATED EXPOSURES WILL REQUIRE A GAS MASK OR RESPIRATOR EQUIPPED WITH APPROPRIATE CANISTER.	D GAS MASK WITH APPROPRIATE CANISTER REQUIRED AT ALL TIMES.			
		E EVACUATE AREA AT ONCE AND ENTER ONLY WITH AIRLINE RESPIRATOR, BLOWER MASK OR CHEMEX MASK.				
INGESTION	A NO UNUSUAL PROCEDURES REQUIRED.	E FOOD AND TOBACCO SHOULD NOT BE PRESENT IN THE WORK AREA. HANDS AND FACE SHOULD BE WASHED BEFORE SMOKING AND EATING.				

REMARKS: **GOOD PRACTICE REQUIRES THAT GROSS AMOUNTS OF ANY CHEMICAL BE REMOVED FROM THE SKIN AS SOON AS IS PRACTICAL

*SUITABLE GAS MASK CANISTER (See SLP Tek Bulletin #3)

Organic Vapor

REVISED: EJSchneider

CHECKED

RRI angner

2/18/76

DATE

4/14/76

MATERIAL SAFETY DATA SHEET

(APPROVED BY THE U.S. DEPARTMENT OF LABOR AS "essentially similar" to form LS# 005-4)

FOR HAZARDOUS PRODUCTS USED IN PLACES OF EMPLOYMENT

Section 1		NAME & PRODUCT	
MANUFACTURER'S NAME (a) THE DOW CHEMICAL COMPANY		EMERGENCY PHONE NO. 24 HOURS (b) 517-636-4400	
STREET ADDRESS (c) 2030 DOW CENTER		For latest data, consult manufacturer.	DATE THIS FORM WRITTEN (d) February 22, 1972
CITY, STATE, ZIP CODE (e) MIDLAND, MICHIGAN 48640		SIGNATURE OF CERTIFYING COMPANY OFFICIAL (f) <i>[Signature]</i>	
CHEMICAL NAME, TRADE NAME, AND SYNONYM(S) (g) Vinyl Chloride, Monomer		91575	
FORMULA OF PRIMARY COMPONENT(S) (STRUCTURAL) (h) $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H} - \text{C} = \text{CCl} \end{array} \quad \text{CH}_2\text{CHCl}$			

Section 2	INGREDIENTS	%	TLV (units)
	Vinyl Chloride	99	500 ppm
	Phenol*	0.005	5 ppm
	(Not specification values)		
	* In inhibited product only.		

Section 3	PHYSICAL DATA
1. BOILING POINT (°F.)	+7.16
2. VAPOR PRESSURE (mmHg at 20°C)	2524
3. VAPOR DENSITY (air=1)	2.15
4. SOLUBILITY IN WATER	Slight
5. SPECIFIC GRAVITY (H ₂ O = 1)	0.9104 20/20°C
6. % VOLATILE BY VOLUME	100
7. COLOR AND ODOR	Colorless *
8. PHYSICAL STATE	Liquidified gas

Section 4	FIRE AND EXPLOSION HAZARD DATA
10. FLASH POINT (AND METHOD USED)	-108.4°F Cleveland Open Cup
11. FLAMMABLE LIMITS (LFL, UFL)	LFL 4 UFL 26
12. EXTINGUISHING MEDIA:	☒ WATER FOG ☒ FOAM ☐ ALCOHOL FOAM ☒ CO ₂ ☒ DRY CHEMICAL ☐ OTHER
13. SPECIAL FIRE FIGHTING PROTECTIVE EQUIPMENT	Self-contained breathing apparatus.

* Uninhibited: Faint, sweet odor. Inhibited: Faint phenolic odor from

14. UNUSUAL FIRE AND EXPLOSION HAZARDS

Vapors can form flammable and explosive mixtures with air at all normal ambient temperatures. All sources of ignition should be avoided in areas where vinyl chloride vapors are present.

Section 5				REACTIVITY DATA	
15. STABILITY	NORMAL CONDITIONS		16. CONDITIONS TO AVOID		
	FIRE CONDITIONS		Exposure to air, oxygen, heat, moisture.		
			Ignites in air at 882°F.		
17. INCOMPATIBILITY (Materials to avoid)	☐ WATER ☐ ACID ☐ BASE ☐ CORROSIVE ☒ OXIDIZING MATERIAL				
	☐ OTHER:				
18. HAZARDOUS DECOMPOSITION PRODUCTS					
Hydrogen chloride, carbon monoxide.					
19. HAZARDOUS POLYMERIZATION	MAY OCCUR	☒	20. CONDITIONS TO AVOID		
	WILL NOT OCCUR		Exposure to oxygen (air), sunlight, moisture and free radical initiators or other catalytic impuri		

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Section 6

HEALTH HAZARD DATA

21. ORAL INGESTION

Not considered a problem because product is a gas at ambient temperatures.

EYE CONTACT

Gas - not likely to cause ill effects. Liquid - capable of causing frostbite-type burns. Inhibitor may accumulate and cause burns.

22. SKIN CONTACT

Gas - not likely to cause irritation. Liquid - capable of causing frostbite-type burns. Inhibitor, if concentrated, may be absorbed in toxic amounts.

24. SKIN ABSORPTION

Not absorbed through skin in pure form. Inhibitor, if concentrated, may be absorbed in toxic amounts.

25. INHALATION (TLV OR SUGGESTED MAXIMUM LEVEL)

TLV - 500 ppm (1970); may be lowered to 200 ppm in 1972.

26. EFFECTS OF OVEREXPOSURE

Lower concentration - dizziness & drunkenness, possibly lung irritation. High concentration - anesthetic effect.

27. FIRST AID PROCEDURES

Flush with plenty of water for at least 15 min.; for eyes, get medical attention. Remove contaminated clothing and footwear of chemical before reuse.

Inhalation: If person experiences ill effects, remove him to fresh air, keep him quiet and warm and get medical attention. Give artificial respiration if breathing stops.*

Section 7

SPILL OR LEAK PROCEDURES

28. STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition, supply ample ventilation, allow only properly protected personnel into the area; do not allow vinyl chloride to enter the sewer system because of explosive hazard.

29. DISPOSAL METHOD

Dispose of vinyl chloride as a vapor, venting to an area free of any source of ignition.

Section 8

SPECIAL PROTECTION INFORMATION

30. VENTILATION

LOCAL EXHAUST

SPECIAL

MECHANICAL (General)

OTHER

Six or more air changes per hr. Control to TLV level.

31. RESPIRATORY PROTECTION (SPECIFY TYPE)

Up to TLV - none; TLV to 2% for 1/2 hr. or less, full face gas mask and canister; greater - self-contained breathing apparatus.

32. PROTECTIVE CLOTHING

Impervious gloves, aprons, shoes. Clean, body-covering clothing.

33. EYE PROTECTION

☐ NOT NORMALLY NECESSARY

☐ SAFETY GLASSES WITHOUT SIDE SHIELDS

☐ SAFETY GLASSES WITH SIDE SHIELDS

☐ CHEMICAL WORKERS GOGGLES

☒ GAS TIGHT GOGGLES OR EQUIVALENT

☐ OTHER:

34. OTHER PROTECTIVE EQUIPMENT

Rescue harness and lifeline for entering tanks or enclosed storage space. Eyewash stations and safety showers should be readily available.

Section 9

SPECIAL PRECAUTIONS OR OTHER COMMENTS

35. PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid all skin and eye contact, especially with inhibited product. Avoid breathing vapors. Vinyl chloride should always be handled with full recognition of its volatility and its flammability. Keep the material enclosed and eliminate all sources of ignition.

36. OTHER PRECAUTIONS

Storage should be in an isolated, well-ventilated area. Pits, depressions and basements should be avoided.

* Ingestion: Not a problem. Gas at room temperature.