



UNION CARBIDE CORPORATION
MATERIAL SAFETY DATA SHEET



Product Name: BUTYL CELLOSOLVE(TM) SOLVENT
MSDS#: 829

Effective Date: 04/25/2000
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Union Carbide urges each customer or recipient of this MSDS to study it carefully to become aware of and understand the hazards associated with the product. The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, and fire prevention, as necessary or appropriate to use and understand the data contained in this MSDS.

To promote safe handling, each customer or recipient should: 1) Notify its employees, agents, contractors and others whom it knows or believes will use this material of the information in this MSDS and any other information regarding hazards or safety; 2) Furnish this same information to each of its customers for the product; and 3) Request its customers to notify their employees, customers, and other users of the product of this information.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

1.1 IDENTIFICATION

Product Name	BUTYL CELLOSOLVE(TM) SOLVENT
Chemical Name	2-Butoxyethanol
Chemical Family	Glycol Ethers
Formula	CH ₃ CH ₂ CH ₂ CH ₂ O CH ₂ CH ₂ OH
Synonym	Ethylene Glycol Monobutyl Ether, Glycol ether EB, EGBE

1.2 COMPANY IDENTIFICATION

Union Carbide Corporation
39 Old Ridgebury Road
Danbury, CT 06817-0001

1.3 EMERGENCY TELEPHONE NUMBER

24 hours a day: 1-800-UCC-HELP (1-304-744-3487)
Number for non-emergency questions concerning MSDS (732) 563-5522
Additional information on this product may be obtained by calling the Union Carbide Corporation Customer Service Center at 1-800-568-4000.

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2. COMPOSITION INFORMATION

Component	CAS #	Amount (%W/W)
Ethylene glycol monobutyl ether	111-76-2	>= 99 <= 100%

3. HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Appearance Transparent colorless

Physical State Liquid

Odor Mild ethereal

Hazards of product **WARNING!** HARMFUL IF ABSORBED THROUGH SKIN.
HARMFUL IF SWALLOWED.
CAUSES EYE AND SKIN IRRITATION.
COMBUSTIBLE.

SWALLOWING LARGE QUANTITIES MAY CAUSE RED BLOOD CELL DAMAGE.

3.2 POTENTIAL HEALTH EFFECTS

Effects of Single Acute Overexposure

Inhalation High concentrations of vapor cause irritation of the respiratory tract, experienced as nasal discomfort and discharge, with chest pain and coughing. Headache, nausea, vomiting, dizziness, and drowsiness may occur.

Eye Contact Causes severe irritation, experienced as discomfort or pain, excess blinking and tear production, with marked excess redness and swelling of the conjunctiva.

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Skin Contact Brief contact may cause slight irritation with itching and local redness. Prolonged contact may cause more severe irritation, with discomfort or pain, local redness and swelling, and possible tissue destruction.

Skin Absorption Effects may include those described for "Swallowing". Moderately toxic. Prolonged or widespread contact may result in the absorption of potentially harmful amounts of material.

Swallowing Moderately toxic. May cause headache, dizziness, incoordination, nausea, vomiting, diarrhea, and general weakness. Ingestion of significant quantities may result in red blood cell hemolysis.

Chronic, Prolonged or Repeated Overexposure

Effects of Repeated Overexposure No adverse effects anticipated from available information.

Other Effects of Overexposure Has caused red blood cell hemolysis in laboratory animals and secondary injury to the kidney and liver. However, humans appear to be resistant to this effect.

Medical Conditions Aggravated by Exposure

Skin contact may aggravate an existing dermatitis.

3.3 POTENTIAL ENVIRONMENTAL EFFECTS

See Section 12 for Ecological Information.

4. FIRST AID PROCEDURES

4.1 INHALATION

Remove to fresh air.

4.2 EYE CONTACT

Immediately flush eyes with water and continue washing for at least 15 minutes. DO NOT remove contact lenses, if worn. Obtain medical attention without delay, preferably from an ophthalmologist.

4.3 SKIN CONTACT

Remove contaminated clothing. Wash skin with soap and water. If irritation persists or if contact has been prolonged, obtain medical attention.

4.4 SWALLOWING

If patient is fully conscious, give two glasses of water. Induce vomiting. This should be done only by medical or experienced first-aid personnel. Obtain medical attention.

4.5 NOTES TO PHYSICIAN

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There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

Flash Point - Closed Cup: *Pensky-Martens Closed Cup ASTM D 93* 68 °C 154 °F

Flash Point - Open Cup: *Cleveland Open Cup ASTM D 92* 85 °C 185 °F

|| Autoignition Temperature: *See Section 8.3 - Engineering Controls*

Flammable Limits In Air:

Lower	1.1 %(V)
Upper	10.6 %(V)

5.2 EXTINGUISHING MEDIA

Extinguish fires with water spray or apply alcohol-type or all-purpose-type foam by manufacturer's recommended techniques for large fires. Use carbon dioxide or dry chemical media for small fires.

5.3 EXTINGUISHING MEDIA TO AVOID

No information currently available.

5.4 SPECIAL FIRE FIGHTING PROCEDURES

Do not direct a solid stream of water or foam into hot, burning pools; this may cause frothing and increase fire intensity.

5.5 SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS

Use self-contained breathing apparatus and protective clothing.

5.6 UNUSUAL FIRE AND EXPLOSION HAZARDS

See Section 8.3 - Engineering Controls

This material may produce a floating fire hazard in extreme fire conditions.

5.7 HAZARDOUS COMBUSTION PRODUCTS

Burning can produce the following products: Carbon monoxide and/or carbon dioxide. Carbon monoxide is highly toxic if inhaled. Carbon dioxide in sufficient concentrations can act as an asphyxiant.

6. ACCIDENTAL RELEASE MEASURES

Steps to be taken if Material is Released or Spilled:

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Small spills can be flushed with large amounts of water; larger spills should be collected for disposal.

Personal Precautions: Wear suitable protective equipment. See Section 8.2 - Personal Protection.

7. HANDLING AND STORAGE

7.1 HANDLING

General Handling

Do not get in eyes, on skin, on clothing.
Do not swallow.
Keep away from heat and flame.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.

FOR INDUSTRY USE ONLY.

Ventilation

General (mechanical) room ventilation is expected to be satisfactory where this product is stored and handled in closed equipment. Special, local ventilation is needed at points where vapor can be expected to escape to the workplace air.

7.2 STORAGE

Glycol ethers as a family of solvents can be stored in carbon steel. Stainless steel or high baked, phenolic-lined tanks may be considered for critical applications sensitive to slight discoloration or trace iron contamination. Piping can be made of the same material as the storage tank. A centrifugal pump is suitable for transfer services. Butyl rubber or EPDM can be used for gaskets and packing. NOTE: UCC does not recommend using aluminum, copper, galvanized iron, galvanized steel, Viton, neoprene, nitrile or natural rubber with glycol ethers. Glycol ethers do not present a significant flammability hazard at normal storage temperatures. They have relatively low vapor pressures, viscosities and freezing points.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

8.1 EXPOSURE LIMITS

Component	Exposure Limits	Skin Form
Ethylene glycol monobutyl ether	20 ppm TWAB ACGIH	Yes
	120 mg/m ³ TWAB OSHA-Vacated	Yes
	25 ppm TWAB OSHA-Vacated	Yes

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50 ppm TWAB OSHA	Yes
240 TWAB OSHA	Yes

In the Exposure Limits Chart above, if there is no specific qualifier (i.e., Aerosol) listed in the Form Column for a particular limit, the listed limit includes all airborne forms of the substance that can be inhaled.

A "Yes" in the Skin Column indicates a potential significant contribution to overall exposure by the cutaneous (skin) route, including mucous membranes and the eyes, either by contact with vapors or by direct skin contact with the substance. A "Blank" in the Skin Column indicates that exposure by the cutaneous (skin) route is not a potential significant contributor to overall exposure.

8.2 PERSONAL PROTECTION

Respiratory Protection: Use self-contained breathing apparatus in high vapor concentrations.

Ventilation: General (mechanical) room ventilation is expected to be satisfactory where this product is stored and handled in closed equipment. Special, local ventilation is needed at points where vapor can be expected to escape to the workplace air.

Eye Protection: Monogoggles

Protective Gloves: Butyl

Other Protective Equipment: Eye Bath, Safety Shower
Chemical apron

8.3 ENGINEERING CONTROLS

PROCESS HAZARD: Sudden release of hot organic chemical vapor or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into hot equipment under a vacuum, may result in ignitions without the presence of obvious ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product in elevated-temperature processes should be thoroughly evaluated to establish and maintain safe operating conditions. Further information is available in a technical bulletin entitled "Ignition Hazards of Organic Chemical Vapor."

Standard (ASTM) test values do not predict many real life situations. Autoignition is the result of a gas-phase runaway reaction which occurs when the heat generation rate inside a given volume of reactant exceeds that of heat loss rate. The heat balance determining autoignition is therefore dependent on factors such as the reactant pressure plus the volume and geometry of any container. The ASTM standard AIT test uses a small (500 ml), heated, open-necked glass

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flask in which autoignition always occurs at atmospheric pressure. The AITs determined using this test can be appreciably greater than those that might be experienced in large commercial equipment, especially if elevated pressures are involved. Any operation at temperatures close to or above the flash point should be reviewed by the appropriate expert (e.g., safety engineer, chemist). When the ASTM autoignition temperature is required it can be obtained by calling Union Carbide.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid

Appearance: Transparent colorless

pH: Not applicable.

Solubility in Water (by weight): 20 °C 100 %

Odor: Mild ethereal

Flash Point - Closed Cup: Pensky-Martens Closed Cup ASTM D 93 68 °C 154 °F

Flash Point - Open Cup: Cleveland Open Cup ASTM D 92 85 °C 185 °F

Percent Volatiles: 100 Wt%

Molecular Weight: 118.2 g/mol

Boiling Point (760 mmHg): 170.5 °C 338.9 °F

Freezing Point: -65 °C -85 °F

Specific Gravity (H₂O = 1): 0.902 20 °C / 20 °C

Vapor Pressure at 20°C: 0.05 kPa 0.4 mmHg

Vapor Density (air = 1): 4.1

Evaporation Rate (Butyl Acetate = 1): 0.06

Melting Point: Not applicable.

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10. STABILITY AND REACTIVITY

10.1 STABILITY/INSTABILITY Stable

Conditions to Avoid: Do not distill to dryness. Avoid excessive temperature or prolonged reflux, such as in batch distillations.

Incompatible Materials: Strong alkalis. High temperatures in the presence of strong bases. Acids. Strong oxidizing agents.

10.2 HAZARDOUS POLYMERIZATION Will Not Occur.

10.3 INHIBITORS/STABILIZERS Not applicable.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Peroral

Rat; LD50 = 2.68 (1.85 - 3.88) ml/kg

Major Signs: abnormal breathing, sluggishness, discolored salivation, unsteady gait

Gross Pathology: liver, kidneys, adrenals discolored, stomach distended, liquid- and gas-filled, intestines containing red fluid

Percutaneous

Rabbit; LD50 = 0.63 (0.388 - 1.03) ml/kg; 24 hr occluded contact.

Major Signs: erythema and necrosis at application site

Gross Pathology: abdominal viscera and lungs discolored; urine discolored

Inhalation

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Vapor Studies: Rat, male; LC50 = 486 (339 - 696) ppm

Major Signs: red discoloration on perineurogenital fur

Gross Pathology: discolored urine, enlarged and discolored kidneys

Inhalation

Vapor Studies: Rat; female; LC50 = 450 (315 - 645) ppm

Major Signs: red discoloration on perineurogenital fur

Gross Pathology: discolored urine, enlarged and discolored kidneys

IRRITATION

Skin: Rabbit; 24 h uncovered

Results: minimal erythema in 2/5; no irritation 3/5

Eye: Rabbit; 0.5 ml; 15% dilution in water

Results: moderate corneal injury

Eye: Rabbit; 0.005 ml

Results: severe corneal injury and iritis

SIGNIFICANT DATA WITH POSSIBLE RELEVANCE TO HUMANS

Results of studies in laboratory animals indicate that ethylene glycol monobutyl ether does not cause specific toxic effects on development offspring. This material does not cause increases in malformations even at dosages which produce clear evidence of maternal toxicity. The types of developmental effects noted at maternally toxic levels are consistent with those which might be anticipated in offspring from mothers suffering from toxic effects or stress as a result of chemical exposure. One epidemiology study reported an association between working in jobs with presumed exposure to ethylene glycol monobutyl ether and congenital malformations. These findings could have been the result of methodological problems with this study and are not consistent with a more recent epidemiology study and findings from animal studies. In laboratory animal studies, large doses of ethylene glycol monobutyl ether have caused injury to liver and kidneys. This injury is believed to be secondary to red blood cell hemolysis, a known effect of this material in rodents. Humans are resistant to the hemolytic effects of ethylene glycol monobutyl ether and therefore the kidney and liver injury noted in animal studies is not considered relevant to human health hazard evaluation.

In an NTP bioassay rats and mice were exposed to ethylene glycol monobutyl ether vapor (6 hours a day, 5 days a week) for a period of two years to investigate the potential for chronic toxicity and carcinogenicity. There were no significant increases in the incidences of any tumor type in rats exposed at concentrations up to 125 ppm, the highest concentration tested in rats. The NTP did find, however, that a questionable trend in pheochromocytoma incidence (benign plus malignant combined) provided "equivocal evidence" of a carcinogenic effect in female rats. In male mice there was a slight and statistically significant increase in the incidence of hemangiosarcomas at 250 ppm, the highest concentration tested in mice. The increase was likely the result of accumulation of iron in the liver resulting from hemolysis of red blood cells. Since humans are resistant to the hemolytic effects of ethylene glycol monobutyl ether, this finding may not be relevant to man. In female mice there was a slight but statistically significant increase in the incidence of

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forestomach squamous cell papillomas and carcinomas (combined) in the 250 ppm exposure group. Since humans have no organ of similar tissue type and function, the relevance of this finding to human health is unclear. Ethylene glycol monobutyl ether has not demonstrated genotoxic activity in a battery of in vitro and in vivo tests.

12. ECOLOGICAL INFORMATION

12.1 ENVIRONMENTAL FATE

BOD (% Oxygen consumption)

	Day 5	Day 10	Day 15	Day 20	Day 30
	26 %	74 %		88 %	

12.2 ECOTOXICITY

Toxicity to Micro-organisms

Bacterial Inhibition; IC50

Result value: > 5000 mg/l

Toxicity to Aquatic Invertebrates

Daphnia; 48 h; LC50

Result value: > 1000 mg/l

Toxicity to Fish

Fathead Minnow; 96 h; LC50

Result value: 1700 mg/l

12.3 FURTHER INFORMATION

Theoretical Oxygen Demand (THOD) - measured: 2.25 mg/mg

Theoretical Oxygen Demand (THOD) - calculated: 2.30 mg/mg

Octanol/Water Partition Coefficient - Measured: 0.83

13. DISPOSAL CONSIDERATIONS

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13.1 WASTE DISPOSAL METHOD

Incinerate in a furnace where permitted under Federal, State, and local regulations. Dispose in accordance with all applicable Federal, State, and local environmental regulations. Empty containers should be recycled or disposed of through an approved waste management facility.

13.2 DISPOSAL CONSIDERATIONS

At very low concentrations in water, this product is biodegradable in a biological wastewater treatment plant. See Section 13.1

Disposal methods identified are for the product as sold. For proper disposal of used material, an assessment must be completed to determine the proper and permissible waste management options permissible under applicable rules, regulations and/or laws governing your location.

14. TRANSPORT INFORMATION

14.1 U.S. D.O.T.

NON-BULK

Proper Shipping Name : NOT REGULATED

BULK

Proper Shipping Name : COMBUSTIBLE LIQUID, NOS

Technical Name : CONTAINS ETHYLENE GLYCOL MONOBUTYL ETHER

ID Number : NA1983

Hazard Class : COMBUSTIBLE LIQUID

Packing Group : PG III

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

15.1 FEDERAL/NATIONAL

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 SECTION 103 (CERCLA)

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The following components of this product are specifically listed as hazardous substances in 40 CFR 302.4 (unlisted hazardous substances are not identified) and are present at levels which could require reporting:

Component	CAS #	Amount
Ethylene glycol	107-21-1	<= 0.2000%
Butanol	71-38-3	<= 0.1000%
Ethylene glycol monoethyl ether	110-80-5	<= 0.1000%
Acetic acid	64-19-7	<= 0.0100%

In addition, this product contains other Glycol Ether(s) which, although included as a broad category on the CERCLA hazardous substance list, has not been assigned a reportable quantity.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 TITLE III (EPCRA) SECTIONS 302 AND 304

The following components of this product are listed as extremely hazardous substances in 40 CFR Part 355 and are present at levels which could require reporting and emergency planning:

None.

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 TITLE III (EPCRA) SECTION 313

The following components of this product are listed as toxic chemicals in 40 CFR 372.65 and are present at levels which could require reporting and customer notification under Section 313 and 40 CFR Part 372:

Component	CAS #	Amount
Glycol Ethers	Not available	<= 100.0000%

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 TITLE III (EPCRA) SECTIONS 311 AND 312

Delayed Hazard : Yes
Fire Hazard : Yes
Immediate Health Hazard : Yes
Reactive Hazard : No
Sudden Release of Pressure Hazard : No

TOXIC SUBSTANCES CONTROL ACT (TSCA)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements.

EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES (EINECS)

The components of this product are on the EINECS Inventory.

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CEPA - DOMESTIC SUBSTANCES LIST (DSL)

The components of this product are on the DSL, or are exempt from reporting under the New Substances Notification Regulations.

15.2 STATE/LOCAL

PENNSYLVANIA (WORKER AND COMMUNITY RIGHT-TO-KNOW ACT)

This product is subject to the Worker and Community Right-to-Know Act. The following components of this product are at levels which could require identification in the MSDS:

Component	CAS #	Amount
Ethylene glycol monobutyl ether	111-76-2	<= 100.0000%

MASSACHUSETTS (HAZARDOUS SUBSTANCES DISCLOSURE BY EMPLOYERS)

The following components of this product appear on the Massachusetts Substance List and are present at levels which could require identification in the MSDS:

Component	CAS #	Amount
Ethylene glycol monobutyl ether	111-76-2	<= 100.0000%

CALIFORNIA PROPOSITION 65 (SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986)

This product contains chemical(s) known to the State of California to cause birth defects or other reproductive harm.

Component	CAS #	Amount
Ethylene glycol monoethyl ether	110-80-5	<= 0.1000%

CALIFORNIA SCAQMD RULE 443.1 (SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 443.1, LABELING OF MATERIALS CONTAINING ORGANIC SOLVENTS)

VOC: Vapor pressure 0.4 mmHg @ 20° C
899 g/l
900 g/l of material less water and less exempted solvents.

This section provides selected regulatory information on this product including its components. This is not intended to include all regulations. It is the responsibility of the user to know and comply with all applicable rules, regulations and laws relating to the product being used.

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16. OTHER INFORMATION

16.1 AVAILABLE LITERATURE AND BROCHURES

Additional information on this product may be obtained by calling the Union Carbide Corporation Customer Service Center at 1-800-568-4000.

16.2 SPECIFIC HAZARD RATING SYSTEM

HMS ratings for this product are: H - 2 F - 2 R - 0

NFPA ratings for this product are: H - 2 F - 2 R - 0

These ratings are part of specific hazard communications program(s) and should be disregarded where individuals are not trained in the use of these hazard rating systems. You should be familiar with the hazard communication applicable to your workplace.

16.3 RECOMMENDED USES AND RESTRICTIONS

FOR INDUSTRY USE ONLY

16.4 REVISION

Version: 5.

Revision: 04/25/2000

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

16.5 LEGEND

TS	Trade Secret
N/A	Not available
W/W	Weight/Weight
VOL/VOL	Volume/Volume
NFPA	National Fire Protection Association
HMS	Hazardous Materials Information System
H	Health
F	Fire

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R	Reactivity
C	Carcinogenic (For use by Union Carbide plants; not part of NFPA System)
T	Reproductive Hazard (For use by Union Carbide plants; not part of NFPA System)
W	Water Reactive
O	Oxidizer
A	Asphyxiant
P	Peroxide Former

The opinions expressed herein are those of qualified experts within Union Carbide. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of the use of the product are not under the control of Union Carbide, it is the user's obligation to determine conditions of safe use of the product.