2-Ethylacrolein

sc-230275

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
2-Ethylacrolein

STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA

SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C5-H8-O, H2C=C(C2H5)CHO, "acrolein, 2-ethyl-", "butyraldehyde, 2-methylene-", ethacrolein, alpha-ethylacrolein, alpha-ethylacrylaldehyde, 2-ethylpropenal, 2-methylenebutanal, 2-methylenebutyraldehyde

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability	3	
Toxicity	3	
Body Contact	2	
Reactivity	1	
Chronic	2	

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

HARMFUL - May cause lung damage if swallowed.
Harmful by inhalation, in contact with skin and if swallowed.
Irritating to eyes, respiratory system and skin.
Highly flammable.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.
■ Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result.
(ICSC13733).
■ Ingestion of acrolein may cause severe gastrointestinal distress with pulmonary congestion and oedema in some individuals.

EYE

■ This material can cause eye irritation and damage in some persons.
■ Irritation of the eyes may produce a heavy secretion of tears (lachrymation).
■ Splashes of acrolein, in the eye, can cause corneal damage, palpebral damage and purulent discharge.
1 ppm of acrolein produces marked irritation of eyes and nose in 5 minutes or less.
■ Precautions for handling reactive unsaturated aldehydes should be the same as for those of highly active eye and pulmonary irritants such as phosgene.
Sufficient engineering controls, with monitoring where possible, are of importance.

SKIN

■ Skin contact with the material may be harmful; systemic effects may resultfollowing absorption.
■ This material can cause inflammation of the skin oncontact in some persons.
■ The material may accentuate any pre-existing dermatitis condition.
■ Repeated exposure may cause skin cracking, flaking or drying following normal handling and use.
■ Open cuts, abraded or irritated skin should not be exposed to this material.
■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

■ Inhalation of vapors or aerosols (mists, fumes), generated by the material during the course of normal handling, may produce toxic effects.
■ The material can cause respiratory irritation in some persons.
The body's response to such irritation can cause further lung damage.
■ Inhalation of vapours may cause drowsiness and dizziness.
This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.
■ Inhalation hazard is increased at higher temperatures.
■ Inhalation of quantities of liquid mist may be extremely hazardous, even lethal due to spasm, extreme irritation of larynx and bronchi, chemical pneumonitis and pulmonary edema.
■ Severe inhalation exposure to acrolein may result in shortness of breath, nausea, pulmonary oedema, tracheobronchitis, vomiting, diarrhoea, prostration and loss of consciousness.
The irritation threshold of acrolein in man is reported to be 0.
■ Exposure to aldehydes causes neurological symptoms such as headache, drowsiness, dizziness, seizures, depression and coma.
Cardiovascular involvement may result in increased heart rate, collapse and low blood pressure; respiratory effects include throat spasms, irritation, difficulty swallowing, pulmonary edema and an asthma-like condition.

CHRONIC HEALTH EFFECTS

■ Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
There is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.
Exposure to Aliphatic aldehydes can cause irritation of the skin.
Lungs of monkeys exposed repeatedly to low concentration s of acrolein (0.7 ppm) showed chronic inflammatory changes, including necrotising bronchitis and emphysema. In some animals non-specific inflammation was seen in liver and kidney with focal calcification of renal tubular epithelium. Monkeys, dogs and guinea pigs exposed continuously to concentrations of 0.22 ppm for 90 days did not exhibit toxic symptoms. At autopsy however many animals showed emphysema, and non-specific inflammatory changes in liver, lung, kidney and heart.
Glycidaldehyde, a potential metabolite of acrolein, is considered to be a carcinogen.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
2-ethylacrolein	922-63-4	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Avoid giving milk or oils.
- Avoid giving alcohol.
- If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

EYE

If this product comes in contact with the eyes

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

SKIN

If skin contact occurs

- Immediately remove all contaminated clothing, including footwear
- Flush skin and hair with running water (and soap if available).

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN

■ Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically.
Treat symptomatically.
for simple aldehydes.
----------BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG)	Not available
Upper Explosive Limit (%)	Not available
Specific Gravity (water=1)	0.859
Lower Explosive Limit (%)	Not available

EXTINGUISHING MEDIA
- Alcohol stable foam.
- Dry chemical powder.

FIRE FIGHTING
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.

When any large container (including road and rail tankers) is involved in a fire,
consider evacuation by 500 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
- Liquid and vapor are flammable.
- Moderate fire hazard when exposed to heat or flame.

Combustion products include carbon monoxide (CO), carbon dioxide (CO_2), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.

FIRE INCOMPATIBILITY
Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
- Remove all ignition sources.
- Clean up all spills immediately.

MAJOR SPILLS
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
- DO NOT allow clothing wet with material to stay in contact with skin
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Containers, even those that have been emptied, may contain explosive vapours.
- Do NOT cut, drill, grind, weld or perform similar operations on or near containers.

RECOMMENDED STORAGE METHODS
- Lined metal can, Lined metal pail/drum
- Plastic pail

For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.

STORAGE REQUIREMENTS
- Store in approved flammable liquid storage area.
- No smoking, naked lights/ignition sources.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry, well-ventilated area.

- Protect containers against physical damage and check regularly for leaks.
- Storage areas should be clearly identified, well illuminated, clear of obstruction and accessible only to trained and authorised personnel - adequate security must be provided so that unauthorised personnel do not have access.
- Store in grounded, properly designed and approved vessels and away from incompatible materials
- Store according to applicable regulations for flammable materials for storage tanks, containers, piping, buildings, rooms, cabinets, allowable quantities and minimum storage distances.
- Use non-sparking ventilation systems, approved explosion proof equipment and intrinsically safe electrical systems.
- Have appropriate extinguishing capability in storage area (e.g. portable fire extinguishers - dry chemical, foam or carbon dioxide) and flammable gas detectors.
- Keep adsorbents for leaks and spills readily available
- For bulk storages, consider use of floating roof or nitrogen blanketed vessels; where venting to atmosphere is possible, equip storage tank vents with flame arrestors; inspect tank vents during winter conditions for vapour/ ice build-up; storage tanks should be above ground and diked to hold entire contents
- Observe manufacturer's storing and handling recommendations.

Air- and light- sensitive.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

• 2-ethylacrolein CAS922-63-4

PERSONAL PROTECTION




RESPIRATOR

•Type A Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

EYE

- Safety glasses with side shields.
- Chemical goggles.

HANDS/FEET

Wear chemical protective gloves, eg. PVC.

NOTE The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

OTHER

- Overalls.
- Eyewash unit.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

ENGINEERING CONTROLS

Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Does not mix with water.
Floats on water.
Toxic or noxious vapours/gas.

State	LIQUID	Molecular Weight	84.12
Melting Range (°F)	Not available	Viscosity	Not available
Boiling Range (°F)	198- 199	Solubility in water (g/L)	Immiscible
Flash Point (°F)	34	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Not available
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	0.859
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	>1
Volatile Component (%vol)	Not available	Evaporation Rate	Not available

APPEARANCE

Liquid; does not mix with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.

STORAGE INCOMPATIBILITY

¦ Acrolein

- is extremely reactive, unstable and polymerises readily, accelerating to violence in contact with acid or base catalysts - water or other contamination may shorten the induction period preceding the onset of polymerisation; uncatalysed polymerisation occurs at 200 deg. C
- under weakly acidic conditions (nitrous fumes, sulfur dioxide, carbon dioxide, some hydrolysable salts or thiourea) may produce exothermic and violent polymerisation
- in storage, over time, can form heat- and shock- sensitive compounds or acids
- unless inhibited (usually by hydroquinone), readily forms explosive peroxides
- may polymerise explosively, especially at elevated temperatures, on contact with oxidisers, strong acids, caustics, sunlight
- is a strong reducing agent
- reacts violently with amines, 2-aminoethanol, ammonia, bromine, ethylenediamine, ethyleneimine, hydroxides, metal salts, sulfur dioxide, thiourea
- exploded violently whilst a sample was stored under refrigeration in the presence of a bottle of volatile amine

(dimethylamine)

- attacks most rubber (butyl has the highest resistance) and plastics
- attacks metals cadmium, copper and its alloys and zinc
- may generate electrostatic charges, due to low conductivity, on flow or agitation
- uninhibited vapours may form polymers in plug vents, confined spaces or flame arresters of storage tanks

Hydroquinone, a stabiliser, ceases to exhibit an significant effect after a short period of time. Such unstabilised material may undergo violent polymerisation.

- Flammable and/or toxic gases are generated by the combination of aldehydes with azo, diazo compounds, dithiocarbamates, nitrides, and strong reducing agents.
- Many aldehydes are incompatible with strong acids, amines, strong oxidizers, and alkaline materials.

Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

2-ethylacrolein

TOXICITY AND IRRITATION

2-ETHYLACROLEIN

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Inhalation (Rat) LC50 289 ppm/4h	

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

For acrolein

The overall evidence from acute, intermediate, and chronic duration studies in experimental animals indicates that the respiratory system is a target for acrolein. While the entire respiratory tract may be affected by acrolein inhalation, the nasal epithelium appears to be more sensitive at lower exposures (<1 ppm), which is consistent with human perception of nasal irritation. The deeper respiratory regions (bronchiolar and alveolar regions) appear to be sensitive to higher exposure levels, with severe effects being observed from exposures of 100 ppm or higher. The available data do not suggest species differences in the respiratory toxicity of acrolein. Humans and animals appear to show similar low concentration effects (i.e., mild irritation). It should be noted, however, that rodents are obligate nosebreathers, while humans are mouth-breathers. As a result, the lower respiratory tract of rodents may not present as likely a target organ as that of humans.

The data in experimental animals clearly indicate that respiratory toxicity is a primary cause of acrolein lethality following inhalation and show an inverse relationship between the exposure concentration and the time it takes for death to occur after acute-duration exposures. Exposure of rats to airborne concentrations of acrolein of 100-40,000 ppm for short periods of time (Volunteers exposed to increasing levels of acrolein vapors for 35 minutes reported statistically significant nose irritation at 0.26 ppm, throat irritation at 0.43 ppm, and a decrease in respiratory rate at 0.60 ppm . No statistically significant difference was observed between controls and subjects exposed to 0.17 ppm. In the same study, constant exposure to 0.3 ppm acrolein for 40 minutes resulted in reports of mild nose irritation shortly after onset of exposure, while throat irritation was reported after 10 minutes. Severity of irritation was subjectively scored as “not at all’ to “a little”. A 20% decrease in respiratory rate was also observed. The significance of the decrease in respiratory rate is not clear, but in animals, particularly rodents, it is considered to represent a reflex response to protect the respiratory tract from toxicants.

Intermediate-duration exposures to acrolein concentrations between 0.4 and 5.0 ppm for up to 180 days caused

increased relative lung weights, as well as histological alterations, inflammation across the entire respiratory tract, and oedema of rats , monkeys, guinea pigs, and dogs, and rabbits and hamsters . Decreased pulmonary function was observed in rats exposed to 4 ppm for up to 62 days. Daily 10-minute exposures of 262 ppm for 8 weeks resulted in peribronchial hemorrhage and bronchial lumen obstruction in rats.
Gastrointestinal effects Gastrointestinal irritation is the primary effect of oral exposure to acrolein. Though the clinical signs are consistent and dose-related across acute and intermediate exposures, possible adaptation to irritating effects may have important implications for chronic exposures. Rats administered a single gavage dose of 25 mg/kg of acrolein in saline showed severe multifocal ulceration of the forestomach and glandular stomach 48 hours after dosing. The areas of ulceration showed severe inflammation, focal hemorrhage, and oedema
Neurological effects Acrolein may induce release of peptides that could play a role in the physiological response to irritants. Concentrations of acrolein between 22 and 249 ppm for 10 minutes induced a dose-related decrease in substance P (a short-chain polypeptide that functions as a neurotransmitter or neuromodulator) and calcitonin gene-related peptide in nerve terminals innervating the trachea of rats . No change was seen in total nerve distribution and number or in vasoactive intestinal peptide. Likewise, substance P-mediated vasodilation of the rat upper respiratory tract was observed at 20 ppm, but not at 2-10 ppm, for 50 minutes.
Reproductive effects Male and female rats exposed to 0.55 ppm acrolein continuously for 26 days days prior to mating and presumed gestational days 0 through 22 showed not affect the number of pregnancies or the number and weights of the fetuses. In another study no effect was seen on the reproductive fitness of rats exposed to 0.4-4 ppm for 62 days.
Carcinogenicity Hamsters exposed to a single acrolein concentration of 4.0 ppm for 7 hours/day, 5 days/week for 52 weeks showed no evidence of respiratory tract tumors or tumors in other tissues and organs. Rats exposed to 8 ppm acrolein for 1 hour/day, 7 days/week for 18 months showed no evidence of tumors in the respiratory tract or in other tissues and organs.
No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions
A. General Product Information
Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)
Disposal Instructions
All waste must be handled in accordance with local, state and federal regulations.
¦ Puncture containers to prevent re-use and bury at an authorized landfill.
Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

DOT:

Symbols:	None	Hazard class or Division:	6.1
Identification Numbers:	UN2929	PG:	II
Label Codes:	6.1, 3	Special provisions:	IB2, T11, TP2, TP13, TP27
Packaging: Exceptions:	153	Packaging: Non-bulk:	202
Packaging: Exceptions:	153	Quantity limitations: Passenger aircraft/rail:	5 L
Quantity Limitations: Cargo aircraft only:	60 L	Vessel stowage: Location:	B
Vessel stowage: Other:	40		

Hazardous materials descriptions and proper shipping names:
Toxic liquids, flammable, organic, n.o.s.

Air Transport IATA:

ICAO/IATA Class:	6.1 (3)	ICAO/IATA Subrisk:	None
UN/ID Number:	2929	Packing Group:	II
Special provisions:	A4		
Cargo Only			
Packing Instructions:	662	Maximum Qty/Pack:	60 L
Passenger and Cargo		Passenger and Cargo	
Packing Instructions:	654	Maximum Qty/Pack:	5 L
Passenger and Cargo Limited Quantity		Passenger and Cargo Limited Quantity	
Packing Instructions:	Y641	Maximum Qty/Pack:	1 L

Shipping Name: TOXIC LIQUID, FLAMMABLE, ORGANIC, N.O.S.
*(CONTAINS 2-ETHYLACROLEIN)

Maritime Transport IMDG:

IMDG Class:	6.1	IMDG Subrisk:	3
UN Number:	2929	Packing Group:	II
EMS Number:	F-E,S-D	Special provisions:	274
Limited Quantities:	100 ml		

Shipping Name: TOXIC LIQUID, FLAMMABLE, ORGANIC, N.O.S.(contains 2-ethylacrolein)

Section 15 - REGULATORY INFORMATION

2-ethylacrolein (CAS: 922-63-4) is found on the following regulatory lists;
"US EPA High Production Volume Chemicals 1994 List of Additions"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Cumulative effects may result following exposure*.
- Possible skin sensitiser*.
- Repeated exposure potentially causes skin dryness and cracking*.
- Vapours potentially cause drowsiness and dizziness*.

* (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

Substance	CAS	Suggested codes
2- ethylacrolein	922- 63- 4	Xn; R22

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■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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