



MATERIAL SAFETY DATA SHEET

Bio-based Ethyl Acetate

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Bio-based Ethyl Acetate

SYNONYM: Acetic Acid Ethyl Ester

MOLECULAR FORMULA: C₄H₈O₂

MOLECULAR WEIGHT: 88.11g/mol

CREATION DATE: Mar 02 2007

CONTACT PERSON:

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2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Product Description: This product is a clear, colorless, mobile liquid with a strong fruity odor.

Health Hazards: Harmful if swallowed or inhaled. Affects central nervous system. May cause irritation to skin, eyes and respiratory tract.

Flammability Hazards: Flammable Liquid and Vapors.

Reactivity Hazards: None known.

Environmental Hazards: Not expected to have significant environmental effects.

Emergency Considerations: Emergency responders must wear the proper personal protective equipment (and have appropriate fire-suppression equipment) suitable for the situation to which they are responding.

EU LABELING AND CLASSIFICATION: This product meets the definition of the following hazard class as defined by the European Economic Community Guidelines.

Hazard Classification: [F] Highly Flammable; [Xi] Irritant;

Risk Phrases:

R11: Highly Flammable;

R36: Irritating to eyes;

R66: Repeated exposure can cause skin dryness and cracking;

R67: Vapors may cause drowsiness and dizziness.

Safety Phrases:

S2: Keep out of the reach of children;

S16: Keep away from sources of ignition – No smoking;

S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice;

S33: Take precautionary measures against static discharges.

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

Acute Inhalation can cause irritation of mucous membranes and upper respiratory tract. High concentrations may cause lung damage. This product is an irritant to the nose, throat, skin, eyes and gastrointestinal tract if swallowed.

Chronic Chronic overexposure may cause anemia with leukocytosis and damage to the liver and kidneys.

3. COMPOSITION, INFORMATION ON INGREDIENTS

CAS No.	EC No.	Chemical Name	Percent
141-78-6	205-500-4	Ethyl Acetate	99.8

4. FIRST AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

EYE CONTACT:

If chemical is in eyes, open victim's eyes while under gentle running water. Use

sufficient force to open eyelids. Have victim “roll” eyes. Minimum flushing is for 15 minutes. Remove contact lenses, if worn. Seek medical attention.

SKIN CONTACT:

Wash contacted area with soap and water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Seek medical attention if irritation develops and persists.

INHALATION:

If chemical is inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention.

INGESTION:

If chemical is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of the label and MSDS with the victim to the health professional.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin problems may be aggravated by prolonged contact. In persons with impaired pulmonary function or obstructive airway diseases, inhalation may cause exacerbation of symptoms due to irritant properties.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE FIGHTING MEASURES

FLASH POINT: 24°F (-4.5°C)

AUTOIGNITION TEMPERATURE: 800°F (427°C)

FLAMMABLE LIMITS (in air by volume, %): Lower 2.2% Upper 9%

FIRE EXTINGUISHING MATERIALS: Carbon dioxide, foam, dry chemical, halon, other "B" type

UNUSUAL FIRE AND EXPLOSION HAZARDS: Above flash point, vapor-air mixtures are explosive within flammable limits above. Thoroughly decontaminate bunker gear and other fire-fighting equipment. Do not flush spill to sewer. Runoff to sewer may cause a fire or explosion hazard.

Explosion Sensitivity to Mechanical Impact: Sensitive

Explosion Sensitivity to Static Discharge: Sensitive

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Proper protective equipment should be used. Personnel should be trained for spill response operations.

Spills: Trained personnel following pre-planned procedures should handle non-incident releases. Minimum Personal Protective Equipment should be gloves, boots, safety glasses, and Tyvek suit. Absorb spilled material using polypads or other suitable absorbent material. Avoid generating mists or sprays. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Monitor area and confirm levels are below exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area. Place all spill residue in an appropriate container and seal. Decontaminate the area thoroughly. Do not mix with wastes from other materials. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations). For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements.

7. HANDLING AND STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing mists or sprays generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Store product in properly labeled, closed containers in cool location, away from sources of ignition and incompatible materials. Protect from physical damage. Residual material may exist in “empty” containers of this product, which could ignite and explode if in contact with a source of ignition. Do not cut

or puncture container. Do not weld on or near the container. Bond or ground all containers while transferring. Open containers carefully slowly in case excess pressure has developed during storage. Keep containers closed when not in use.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use local exhaust ventilation, and process enclosure if necessary, to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

EXPOSURE LIMITS/GUIDELINES:

Chemical Name	CAS#	ACGIH-T LV's	OSHA PEL's	NIOSH-T LV's	Other
Ethyl Acetate	141-78-6	400 ppm	400 ppm.	400 ppm	N.E.

NE = Not Established. NIC = Notice of Intended Change See Section 16 for Definitions of Terms Used.

Currently, International exposure limits are established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: If exposure limits are exceeded, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under U.S. Federal OSHA's Respiratory Protection Standard (1910.134- 1998) or the regulations of various U.S. States, Canada, EU Member States, or those of Japan. Air-purifying respirators with dust/mist/fume filters are recommended if operations may produce mists or sprays from this product.

EYE PROTECTION: Splash goggles or safety glasses with side shields recommended. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian Standards, and the European Standard EN166, Australian Standards, or relevant Japanese Standards.

HAND PROTECTION: Compatible protective gloves recommended. Wash hands after removing gloves. If necessary, refer to U.S. OSHA 29 CFR 1910.138, the European

Standard DIN EN 374, the appropriate Standards of Canada, Australian Standards, or relevant Japanese Standards.

BODY PROTECTION: Use body protection appropriate for task. Coveralls, rubber aprons, or chemical protective clothing made from natural rubber are generally acceptable, depending upon the task. If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical form:	Liquid
Odour:	Fruity Odour
Colour:	Colourless
Melting Point:	-84 °C
Flash Point:	-4.5 °C (24 °F)
Relative Evaporation Rate:	2.4
Explosion Limits:	2.0 – 11.5 vol %
Vapour Pressure:	98.3 hPa at 20 °C
Relative vapour density:	3.0
Relative density:	0.9003 at 20 °C
Solubility:	soluble in water (8g/100ml) at 25 °C
Log Pow:	0.68
Auto-ignition temperature:	427 °C
Dynamic Viscosity:	0.00045 Pa.s at 20 °C
Minimum Ignition energy:	0.46 mJ
Specific conductivity:	>100000 pS/m
Surface tension:	0.024 N/m at 20 °C

10. STABILITY AND REACTIVITY

STABILITY: Stable under ordinary conditions of use and storage

DECOMPOSITION PRODUCTS: Oxides of carbon may form when heated to decomposition.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Keep away from peroxides and other polymerization initiators, oxidizing agents such as nitric acid, perchloric acid, chromium trioxide, chlorosulfonic acid, silica gel, alumina, strong acids or amines.

HAZARDOUS DEPOLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The specific toxicology data available for components greater than 1% in concentration are as follows

COMPOUND [CAS]	ROUTE	SPECIES	EXPOSURE & DOSE
CAS# 141-78-6	Oral	Rat, adult	LD 50: 200 mg/m ³
	Skin	Rabbit	LD50: 5620 mg/kg

SUSPECTED CANCER AGENT: The components of this product are not listed by agencies tracking the carcinogenic potential of chemical compounds as follows:

Carcinogenity

NTP Regulated NO IARC Regulated NO OSHA Regulated NO

IRITANCY OF PRODUCT: Airborne mists of this product can irritate eyes.

SENSITIZATION TO THE PRODUCT: These products are not known to cause human skin or respiratory sensitization.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: The components of this product are not reported to produce mutagenic effects in humans. Embryotoxicity: The components of this product are not reported to produce embryotoxic effects in humans. Teratogenicity: The components of this product are not reported to produce teratogenic effects in humans.

Reproductive Toxicity: An epidemiology study under conditions of normal occupational exposure to indicated no effect on fertility.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL FATE: When released into the soil, this material may leach into ground water. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into water, this material is expected to quickly evaporate. When released into water, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate.

ENVIRONMENTAL TOXICITY:

96 Hr LC 50 Pimephales promelas: 230 mg/L

48 Hr EC50 Daphnia magna: 717 mg/L

48 Hr EC50 Scenedesmus subspicatus: 3300 mg/L

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

Dispose of waste in a RCRA permitted hazardous waste disposal facility. Flash point below 240°F (-4.5°C) – EPA Hazardous Waste No: U112. Federal Resource Conservation and Recovery Act 40CFR261.21.

14. TRANSPORT INFORMATION

US DOT, IATA, IMO, ADR:

DOT CLASSIFICATION

UN1173

Packing Group II Hazard

Classification 3

Proper Shipping Name: Ethyl
Acetate

**DOT LABELING
REQUIREMENTS**

Flammable Liquid

**IATA LABELING
REQUIREMENTS**

Flammable Liquid

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS: This product is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): This product is classified as Dangerous Goods, by rules of IATA:

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION: This product is classified as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is classified by the United Nations Economic Commission for Europe to be dangerous goods.

15. REGULATORY INFORMATION

UNITED STATES REGULATIONS:

SARA REPORTING REQUIREMENTS SARA Title III Section
313
None

SARA Title III Section 312 Hazard Category (40 CFR 311/312) Acute Health: Yes Release of Pressure: No Chronic Health: No Reactive: No Fire: Yes

MARINE POLLUTANT

This product contains no component listed as a Marine Pollutant under 49 CFR 172.101, Appendix B.

TSCA

All components in this product mixture are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

U.S. CERCLA REPORTABLE QUANTITY (RQ): 5,000 Lbs.

U.S. TSCA INVENTORY STATUS: All of the components of this product are not listed in the TSCA Inventory.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): This product does not contain any component above the 0.1% level which is listed as a California Proposition 65 chemical. Note the chemical identity of some or all components present is confidential business information (trade secret) and is being withheld as permitted by 29CFR1910.1200 (i).

CANADIAN REGULATIONS:

CANADIAN DSL/NDL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: Class B-2 Flammable Liquid

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION: This product meets the definition of the following hazard class as defined by the
Hazard Classification: [F] Highly Flammable; [Xi] Irritant;
Risk Phrases: R11: Highly Flammable; R36: Irritating to eyes; R66: Repeated exposure can cause skin dryness and cracking; R67: Vapors may cause drowsiness and dizziness.
Safety Phrases: S2: Keep out of the reach of children; S16: Keep away from sources of ignition – No smoking; S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice; S33: Take precautionary measures against static discharges.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac: Listed

Australian Inventory of Chemical Substances (AICS): Listed

Korean Existing Chemicals List (ECL): Listed

Japanese Existing National Inventory of Chemical Substances (ENCS): Listed Philippines

Inventory of Chemicals and Chemical Substances (PICCS): Listed Swiss Giftlist List of

Toxic Substances: Listed

U.S. TSCA: Listed

16. OTHER INFORMATION

The information in this safety data sheet is based on data and samples provided. The sheet was written to the best of our ability and according to the state of knowledge at that time. The safety data sheet only constitutes a guideline for the safe handling, use, consumption, storage, transport and disposal of the substances/preparations/mixtures mentioned under point 1. New safety data sheets are written from time to time. Only the most recent versions may be used. Old versions must be destroyed. Unless indicated otherwise word for word on the safety data sheet, the information does not apply to

substances/preparations/mixtures in purer form, mixed with other substances or in processes.

The safety data sheet offers no quality specification for the substances/preparations/mixtures in question. Compliance with the instructions in this safety data sheet does not release the user from the obligation to take all measures dictated by common sense, regulations and recommendations or which are necessary and/or useful based on the real applicable circumstances. Godavari Biorefineries Limited does not guarantee the accuracy or exhaustiveness of the information provided.