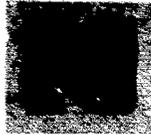




FYI-94-001170  
INIT 07/14/94



June 19, 1987



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CERTIFIED MAIL  
RETURN REQUEST REQUESTED

Dr. Robert H. Brink  
Executive Secretary  
Interagency Testing Committee  
Environmental Protection Agency (TS-792)  
Room 535, East Tower  
401 M St., SW  
Washington, DC 20460

Dear Dr. Brink:

Reference: Crotonaldehyde (CAS No. 4170-30-3)

The Chemicals Division of Eastman Kodak Company wishes to comment on crotonaldehyde, which appears on the 1987 List of Chemicals Selected for Review by the TSCA Interagency Testing Committee (ITC), as indicated in 52 FR 10409, April 1, 1987. This information responds to specific written questions identified to us by Dynamac Corporation on April 13, 1987.

This letter contains confidential information, enclosed in brackets, which is exempt from public disclosure pursuant to Section 552(b)(4) of Title 5 of the United States Code. A nonconfidential copy of this letter is enclosed and also is being provided to Dynamac Corporation.

1. Production volume and process data:

Annual Current and Projected Nonconfidential Production Range: 5-15 million pounds.



Crotonaldehyde is manufactured from acetaldehyde, using a continuous enclosed reactor system via the aldol condensation route. The product is purified by continuous enclosed distillation.

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2. Use Information

Approximately 1/3 of our annual production [ ] is for use as a site limited intermediate to manufacture crotonic acid in a continuous enclosed process. The remainder of the annual production [ ] is sold to domestic chemical companies, who are believed to convert it chemically to other products. There are few [ ] customers for crotonaldehyde and the largest users are major chemical companies who would be expected to exercise recommended procedures for safe handling of this chemical. [ ]

[ ] There are no known sales to distributors.

Shipment of crotonaldehyde is primarily via tank car or truck, with 3% or less shipped in drums.

To our knowledge Eastman is the only domestic supplier of this chemical.

Attached is Eastman's Material Safety Data Sheet for this substance.

3. Unpublished Toxicity Data

Such data have been provided to the Environmental Protection Agency (EPA) under TSCA Sect. 8(d).

4. Occupational Exposure Data

During a year about 14-20 workers are potentially exposed during the production of crotonaldehyde. These include production, maintenance, analytical and materials handling personnel. About 6 to 10 additional workers are potentially exposed during the use of crotonaldehyde to manufacture crotonic acid.

Potential exposure occurs only during sampling and analysis, connecting and disconnecting transfer lines and during limited maintenance. Average daily exposure of each worker is less than 1 hour for an average of 330 days/year.

Engineering controls consist of enclosed continuous equipment in well ventilated buildings or outdoors. Local exhaust for vapors is provided at sampling points. Personal protective equipment worn at potential exposure points consists of vapor tight goggles, full face respirator, cap, overalls, and rubber gloves. The fact that respiratory and eye irritation is significant at crotonaldehyde vapor concentrations of 10 ppm or above precludes an individual from

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working in an area containing these vapors at or above that level, and serves as an additional warning to leave the area or wear proper protective equipment in the event that such concentrations were reached. Crotonaldehyde exposure is already being regulated by OSHA with a Permissible Exposure Limit (PEL) of 2 ppm TWA. Worker exposure is controlled to be well within this limit.

5. Environmental Data

Eastman's equipment for manufacture and use of crotonaldehyde is especially designed to minimize any atmospheric release. Waste streams from these processes are either incinerated or sent to an industrial waste water treatment system. Air emission controls include scrubber, vent condenser, and conservatic ent.

Yours very truly,



R. D. Gerwe, Ph.D  
Senior Product Safety Representative  
Material Safety Program

smb/PS8385F

Enclosure

cc: ✓ Ms Roberta Wedge  
Staff Scientist  
Dynamac Corporation  
The Dynamac Building  
11140 Rockville Pike  
Rockville, MD 20852

**MATERIAL SAFETY DATA SHEET**

**EASTMAN CHEMICAL PRODUCTS, INC.  
EASTMAN KODAK COMPANY  
Kingsport, Tennessee 37662**

For Health Hazard Information, Call: (615) 229-6094

For Other Information, Call: (615) 229-2000 Date of Preparation: 03-10-86

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**SECTION I. IDENTIFICATION**

-- Product Name:

**Crotonaldehyde**

-- Synonyms: PM 161; 2-Butenal,

-- Formula:  $C_4H_6O$

-- Molecular Weight: 70.09

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**SECTION II. PRODUCT AND COMPONENT HAZARD DATA**

<b>A. COMPONENTS:</b>	<b>Approx Weight %</b>	<b>CAS Reg No</b>	<b>Eastman Kodak No</b>
<b>Crotonaldehyde*</b>	<b>92</b>	<b>4170-30-3</b>	<b>901878</b>
<b>Water</b>	<b>8</b>		

\*Hazardous chemical as defined by OSHA, 29 CFR 1910.1200.

**B. PRECAUTIONARY LABEL STATEMENTS:**

**DANGER! FLAMMABLE**  
**MAY BE FATAL IF INHALED OR ABSORBED THROUGH THE SKIN**  
**CAUSES SKIN AND EYE BURNS**  
**HARMFUL IF SWALLOWED**  
**VAPOR EXTREMELY IRRITATING**  
**MAY FORM EXPLOSIVE PEROXIDES**  
**MAY POLYMERIZE**

Keep away from heat, sparks, and flame.  
Do not breathe vapor.  
Do not get in eyes, on skin, on clothing.  
Keep container tightly closed.  
Use only with adequate ventilation.  
Wash thoroughly after handling.  
Do not allow to evaporate to near dryness.  
Keep from contact with alkaline materials.

**\*POISON-INHALATION HAZARD\* CALL A PHYSICIAN IMMEDIATELY**

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**FIRST AID:** If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes and skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes. If swallowed, DO NOT INDUCE VOMITING. If conscious, give one glass of milk or water. Never give anything by mouth to an unconscious person.

**IN CASE OF FIRE:** Use water spray, dry chemical, "alcohol" foam, or CO<sub>2</sub>. Water may be ineffective in fighting the fire. Use water spray to keep fire-exposed containers cool.

**IN CASE OF SPILL:** Emergency personnel should wear self-contained breathing apparatus. Eliminate all ignition sources. Use water spray to disperse vapors and to flush spill area. Prevent runoff from entering drains, sewers, and streams.

Since emptied containers retain product residue, follow label warnings even after container is emptied. Do not cut, drill, grind, or weld on or near this container.

**FOR MANUFACTURING USE ONLY**

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**SECTION III. PHYSICAL DATA (1)**

- Appearance and Odor: Clear, colorless liquid; pungent, suffocating odor; lachrymator.
- Boiling Point: 84°C (183°F).
- Specific Gravity (H<sub>2</sub>O = 1): 0.871.
- Vapor Pressure: 32 mm Hg at 20°C.
- Percent Volatile by Volume: Approx 100.
- Vapor Density (Air = 1): 2.41.
- Evaporation Rate (ethyl ether = 1): 0.2.
- Solubility in Water: Appreciable.

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**SECTION IV. FIRE AND EXPLOSION HAZARD DATA**

- Flash Point: 7°C (45°F); Method Used: Tag Closed Cup.
- Autoignition Temperature: 160°C (320°F); Method Used: ASTM E 659.
- Cool Flame Autoignition Temperature: 121°C (250°F).
- Flammable Limits: LEL 2.15% at 75°F UEL 19.5% at 165°F.
- Extinguishing Agent: Water spray, dry chemical, CO<sub>2</sub>, or "alcohol" foam.
- Special Fire-Fighting Procedures: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Water may be ineffective for fire fighting. Use water spray to keep fire-exposed containers cool.
- Unusual Fire and Explosion Hazards: Flammable liquid (see Section VIII). At elevated temperatures, such as in fire conditions, polymerization may take place. If the polymerization takes place in a container, there is a possibility of violent rupture of the container. Vapors are heavier than air and may travel considerable distance to a source of ignition and flash back.

## SECTION V. REACTIVITY DATA (1)

- **Stability:** Stable at ambient temperatures; however, may polymerize at elevated temperatures. The material readily oxidizes to an acid and may form explosive peroxides on exposure to air.
- **Stability calculated by ASTM CHEM 4.3:** Sensitive.
  - Heat of decomposition: -0.71 kcal/g.
  - Heat of combustion: -7.48 kcal/g.
- **Incompatibility:** Oxidizing and alkaline materials can cause a vigorous reaction. Also see "Hazardous Polymerization" below.
- **Hazardous Decomposition Products:** As with any other organic material, combustion will produce carbon dioxide and probably carbon monoxide.
- **Hazardous Polymerization:** May occur. **Conditions to Avoid:** Violent polymerization may occur upon contact with alkaline materials such as caustic, ammonia or amines. Polymerization will also occur at elevated temperatures.

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## SECTION VI. TOXICITY AND HEALTH

### A. EXPOSURE LIMITS

- OSHA Permissible Exposure Limit (PEL): 2 ppm-TWA.
- Threshold Limit Value (TLV): 2 ppm-TWA, ACGIH, 1985-86.
- A NIOSH industrial hygiene analytical method is available. (2)

### B. EXPOSURE EFFECTS

**Ingestion:** Harmful if swallowed.

**Inhalation:** May be fatal if inhaled. Vapor causes severe upper respiratory tract irritation.

**Eyes:** Liquid causes severe burns. Vapor extremely irritating.

**Skin:** May be fatal if absorbed through the skin. Causes burns.

### C. FIRST AID

**Ingestion:** DO NOT INDUCE VOMITING. If conscious, give one glass of milk or water. Never give anything by mouth to an unconscious person. Call a physician.

**Inhalation:** Remove from exposure. If not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen. Call a physician immediately.

**Eyes:** Immediately flush with plenty of water for at least 15 min. Call a physician.

**Skin:** Immediately flush with plenty of water for at least 15 min while removing contaminated clothing and shoes. Call a physician immediately. Wash contaminated clothing before reuse. Destroy contaminated shoes.

#### D. TOXICITY DATA

Test	Species	Result	Toxicity Classification (3)
Acute oral LD <sub>50</sub>	Rat	300 mg/kg (4)	Moderately toxic
Dermal LD <sub>50</sub>	Rabbit	150 to 200 mg/kg (4)	Moderately toxic
Dermal LD <sub>50</sub>	Rabbit	320 mg/kg (4)	Slightly toxic
Dermal LD <sub>50</sub>	Guinea pig	500 to 1000 mg/kg (4)	
Inhalation LC <sub>50</sub>	Rat	600 ppm/0.5 h (5)	
Inhalation LC <sub>50</sub>	Rat	380 ppm/1 h (5)	
Inhalation LC <sub>50</sub>	Rat	85 ppm/4 h (5)	Highly toxic
Eye irritation	Rabbit	Severe (4)	

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#### SECTION VII. VENTILATION AND PERSONAL PROTECTION

##### A. VENTILATION:

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. Normally, local exhaust ventilation or an enclosed handling system will be needed to control airborne levels below recommended exposure limits (see Section VI-A).

##### B. RESPIRATORY PROTECTION:

An appropriate full-face NIOSH-approved respirator for organic vapor must be worn if exposure is likely to exceed recommended exposure limits (see Section VI-A). If respirators are used, a program should be established to assure compliance with OSHA Standard 29 CFR 1910.134.

##### C. SKIN AND EYE PROTECTION:

Wear safety glasses with side shields (or goggles) and a face shield. Impermeable gloves should be worn. An impermeable apron or smock and boots should be worn to minimize skin contact. A safety shower, an eye bath, and washing facilities should be available. Wash thoroughly after handling.

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#### SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Material is classified as a Flammable Liquid. Keep away from heat, sparks, and flame. Keep container closed. Use with adequate ventilation. Vapors are heavier than air and may travel along the ground or may be moved by ventilation to an ignition source and flash back. Possible peroxide former. Do not evaporate to near dryness. Keep container tightly closed. Do not contaminate.

Since emptied packages retain product residue, follow label warnings even after package is emptied. Do not cut, drill, grind, or weld on or near this container.

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#### SECTION IX. SPILL, LEAK, AND DISPOSAL PRACTICES

Steps to be Taken in Case Material is Released or Spilled: Wear appropriate protective clothing (including a self-contained breathing apparatus). Eliminate all ignition sources. Small spills may be collected with absorbent materials. For large spills, use water spray to disperse vapors and to flush area. Prevent runoff from entering drains, sewers, or streams.

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**Waste Disposal Method:** Mix with compatible chemical which is less flammable and incinerate. Observe all Federal, state, and local laws concerning health and environment.

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**SECTION X. ENVIRONMENTAL EFFECTS DATA**

- A. SUMMARY:** Some laboratory data and published data are available for this product, and these data (6-8) have been used to provide the following estimate of environmental impact:

This product has a moderate to high biological oxygen demand, and it may cause oxygen depletion in aquatic systems. It has a high potential to affect aquatic organisms. This product is biodegradable and is not expected to persist in the environment. The direct, instantaneous discharge to a receiving body of water of an amount of this product which will rapidly produce by dilution a final concentration of 0.15 mg/L or less is not expected to have any adverse environmental impact. After dilution with a large amount of water, followed by secondary waste treatment, this product is not expected to have any adverse environmental impact.

**B. OXYGEN DEMAND DATA**

- ThOD: 2.28 g/g (6)
- COD: 97% of ThOD (7)
- BOD<sub>5</sub>: 1.54 g/g (6); 37% of ThOD (7)
- BOD<sub>10</sub>: 1.30 g/g (7)

**C. ACUTE AQUATIC EFFECTS**

- 96-h LC<sub>50</sub>; Bluegill sunfish: 3.5 mg/L (7,8)
- 96-h LC<sub>50</sub>; Tidewater silversides: 1.3 mg/L (7,8)

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**SECTION XI. TRANSPORTATION**

**DOT Hazard Classification:** Flammable liquid (Poison - Inhalation hazard).  
**Flashpoint:** See Section IV.  
**Proper DOT Shipping Name:** Crotonaldehyde.  
**UN Number:** 1143.

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**SECTION XII. REFERENCES**

1. File data, Toxicology and Chemical Safety Services, Eastman Chemicals Division, Eastman Kodak Company, Kingsport, Tennessee.
2. NIOSH Manual of Analytical Methods, 2nd Edition, Volume 5. Issued by the National Institute for Occupational Safety and Health. Washington, U. S. Government Printing Office, 1979, Method 285.
3. AM IND HYG ASSOC Q 10, 93-96 (1949).
4. G. D. Clayton and F. E. Clayton, Editors. FATTY'S INDUSTRIAL HYGIENE AND TOXICOLOGY, 3rd Revised Edition, Volume 2A. New York, Wiley-Interscience, 1981, p. 2651.
5. AM IND HYG ASSOC J 28, 561-566 (1967).

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6. Unpublished data, Health and Environment Laboratories, Eastman Kodak Co., Rochester, New York.

7. K. Verschueren. HANDBOOK OF ENVIRONMENTAL DATA ON ORGANIC CHEMICALS, 2nd Edition. Van Nostrand Reinhold Company, New York, 1983, pp. 410-411.

8. J HAZARDOUS MATER 1, 303-318 (1975/77).

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The information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers.  
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