

DEPARTMENT 259 - STANDARD MANUFACTURING PROCESS

PYRANOLS AND INERTEENS

APPENDIX J

SAFETY AND TOXICITY DATA

(Sections I & II of Appendix J refer to all of Dept. 246/259, only part of which is used to produce Pyranols/Inerteens.)

I. SAFETY EQUIPMENT

A. Fire Extinguishers

1. Carbon dioxide - 1st floor, NE of lean-to
2. Dry chemical - 1st floor, SE of lean-to
3. Dry chemical - 2nd floor, west wall
4. Dry chemical - 2nd floor, west wall

B. Gas Masks

1. 1st floor, on sprinkler house
2. 1st floor, outside west wall of repair room
3. 2nd floor, on west wall
4. Control room, east wa-1
5. 4th floor, on handrail by #1 chlorinator
6. 4th platform, Aroclor column (2)

C. Scott Air Pak

1. Outside west wall of lean-to

D. Emergency Clothing

1. Box on 2nd floor, west wall

E. Safety Showers with Eye Wash

1. Batch department, 1st floor
2. Batch department, 2nd floor
3. Batch department, 4th floor
4. Continuous department, 1st floor
5. Continuous department, 2nd floor
6. Continuous department, 3rd floor
7. West side of tank farm (alarm in control room)
8. Control room (eye bath only).



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II. SAFETY PRECAUTIONS AND DATA

A. Personal Safety Equipment:

<u>Mandatory</u>	<u>Recommended</u>
1. Hard hat	1. Rubber or canvas gloves
2. Safety glasses	2. Goggles
3. Safety shoes	3. Rubber overshoes

B. Fire

None of the raw materials or finished products are fire hazards. Fire extinguishers are available in many areas throughout the department.

C. Toxicity (see next section).

D. Miscellaneous

There are many accidents that can occur which may be classified as health and safety hazards. These accidents can result from steam leaks, product leaks, and other minor hazards normally present to some degree in a chemical plant.

E. Safety Record (Depts. 246/259)

1. Lost Time Accidents - last occurred on January 28, 1948.
2. Serious Injuries - the last two serious injuries were:
 - a. April 12, 1973 - Broken finger from dropped T/C lid.
 - b. February 15, 1972 - Finger laceration while working on T/C.
3. Minor Injuries - for the year 1973, there were two minor injuries, for an indices of 0.10 minor injuries/man/year in Departments 246/259.

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III. TOXICITY

AROCLORS

1. Recommended Threshold Limit Value (T.V.L.)

- a. Aroclor 1242 - 1.0 mg per cubic meter of air.
(0.50 action level)
- b. Aroclor 1254 - 0.5 mg per cubic meter of air.
(0.25 action level)

2. Hazards and Control

- a. Inhalation: Absorption is chiefly by inhalation. Concentrations in the workroom atmosphere should be maintained below the recommended levels. Where the chlorinated diphenyls are used at room temperatures, the hazard of inhalation is considered slight or absent. When these materials are subjected to elevated temperatures, the process either should be completely enclosed or other adequate mechanical exhaust ventilation must be provided to reduce concentrations to safe levels.
- b. Skin contact: Operations and handling procedures should be such as to avoid the possibility of prolonged or repeated skin contact. Contaminated clothing must be laundered before reuse.
- c. Eye contact: Goggles or face shield should be used where there is a possibility of liquid splashes.

3. Emergency Treatment: Skin surfaces exposed to chlorodiphenyls should be thoroughly washed with soap and water at once. If clothing has been contaminated, it should be removed promptly.

If exposure to a high vapor concentration occurs, as in the case of spills at elevated temperatures, the patient should be moved from exposure and kept at rest until seen by a physician. Oxygen should be administered if breathing is difficult.

Eyes contaminated with chlorodiphenyl should be irrigated with water for at least 15 minutes and the patient should be seen by a physician.

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APPENDIX J (Cont'd)

III. TOXICITY (Cont'd)

Special procedures: Persons who are regularly or repeatedly exposed to chlorodiphenyls should be examined periodically to detect early evidence of skin irritation and/or liver damage. Persons with known liver disease should not be exposed to repeated contact with the chlorodiphenyls.

- * The information in this section is from the Hygienic Guide Series published by the American Industrial Hygiene Association. The particular pamphlet is "Chlorodiphenyls", Jan.-Feb., 1965.

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APPENDIX J - SAFETY AND TOXICITY DATA (Cont'd)

III. TOXICITY (Continued)

The following toxic rating code will be used in describing the toxicity of these materials:

- 0 - none
- 1 - slight
- 2 - moderate
- 3 - high
- U - unknown

A. Biphenyl (Code 82601)

Threshold Limit Value (TLV for 8 hours) = 0.2 ppm
or 1.0 Mg/M². Action Level = 0.1 ppm or 0.5 Mg/M².

1. Synonyms: Diphenyl
2. Description: White flakes or solid off-white mass somewhat pleasant odor.
3. Constants: Mol. Wt. 154.2; M.P. 69°C; B.P. 255°C;
Density: .9910@ 75°/4°C.
4. Flash Point: 235°F (C.C.)
5. Auto Ignition Temperature: 1004°F.
6. Toxic Hazard Rating: Acute Local: U
Acute Systematic: Ingestion 3, Inhalation 3
Chronic Local: U
7. Fire Hazard: Definitely when exposed to heat or flame; can react with oxidizing materials.
8. Fire Fighting: CO₂ or dry chemical.
9. Formula: C₆H₅C₆H₅
10. Biphenyl vapors are irritating to the upper respiratory tract. Workers should not be exposed to vapor levels throughout their shift in excess of the threshold limit value of 1 milligram per cubic meter of air (or about 0.2 ppm). The compound, or organic solutions of the compound can absorb through the intact skin; therefore, repeated skin contact should be avoided.
11. See Hygienic Guide Series on "Diphenyl".

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APPENDIX J - SAFETY AND TOXICITY DATA (Cont'd)

III. TOXICITY (Cont'd)

B. Chlorine (Code 81059).

1. Description: Greenish yellow gas
2. Formula: Cl_2
3. Constants: Mol. Wt. 70.914; M.P. = 101°C ; B.P. 34.5°C ; Density 1.47 @ 0°C .
4. Toxic Hazard Rating: Acute Local: Irritant 3; Inhalation 3; Acute Systemic: 0
Chronic Local: U
Chronic Systemic: U
T.L.V. - 1 ppm in air per 8 hour day.
0.5 ppm action level.
5. Toxicology: Chlorine is extremely irritating to the mucous membranes of the eyes and respiratory tract. It combines with moisture to liberate nascent oxygen and from hydrochloric acid.

Both these substances, if present in quantity, cause inflammation of the tissues with which they come in contact. If the lung tissues are attacked, pulmonary edema may result. A concentration of 3.5 ppm produces a detectable odor; 15 PPM causes immediate irritation of the throat. Concentrations of 50 ppm are dangerous for even short exposures. 1000 ppm may be fatal even when the exposure is brief.

Because of its intensely irritating properties, severe industrial exposure seldom occurs as the workman is forced to leave the area before he can be seriously affected. In cases where this is impossible, the initial irritation of the eyes and mucous membranes of the nose and throat is followed by cough, a feeling of suffocation and later pain and a feeling of constriction in the chest. If exposure has been severe, pulmonary edema may follow with rales being heard over the chest.

6. Fire Hazard: Moderate -- can react to cause fire or explosion upon contact with turpentine, ether, ammonia gas, illuminating gas, hydrocarbons, hydrogen and powdered metals.

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III. TOXICITY (Cont'd)

- B. 7. Explosion Hazard: Present by reaction with reducing agents.
8. Disaster Control: Dangerous; emits highly toxic fumes; will react with water to form toxic and corrosive fumes of HCl; is heavier than air -- gas will hug the ground. People without adequate protection should go across wind until out of the affected area.
- C. HCl Off-Gas (Code 828.51)
1. Synonyms: Muriatic Acid, Chlorophydric Acid, Hydrogen Chloride
2. Description: Colorless gas.
3. Formula: HCl
4. Toxic Hazard Rating:
Acute Local: Irritant 3, Ingestion 3, Inhalation 3
Acute Systemic: U
Chronic Local: Irritant 2
Chronic Systemic: U
5. TLV: 5 ppm in air for 8 hour day.
Action Level = 2.5 ppm
6. Toxicology: Hydrogen chloride is an irritant to the mucous membranes of the eyes and respiratory tract. Concentration of 35 ppm causes irritation of the throat after short exposure. Concentrations of 50 to 100 ppm are tolerable for one hour. More serious exposures result in pulmonary edema and often laryngeal spasm. Concentrations of 1000 to 2000 ppm are dangerous even for brief exposures. Mists of HCl are considered less harmful than the anhydrous form since the droplets have no dehydrating effect.
7. See Hygienic Guide Series on "Hydrogen Chloride."

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III. TOXICITY (Cont'd)

D. Ferric Chloride (Code 33500)

T.L.V. of 1.0 Mg/M³
Action Level = 0.5 Mg/M³

1. Description: Granular solid
2. Formula: FeCl₃ (Anhydrous)
3. Constants: Mol. Wt. = 166.22, Melting Pt = sublimes, solubility in H₂O = very soluble with heat rise.
4. Toxic Hazard Rating:

Acute Local: Irritant 1: Ingestion 1
Acute Systemic: U
Chronic Local: Irritant 1
Chronic Systemic: U
5. Fire Hazard: There is no fire hazard under normal conditions, but it will emit toxic fumes at high temperatures.
6. Handling: Protect the skin with approved protective clothing, avoid the breathing of FeCl₃ dust, wear approved respirator with adequate cartridge, and protect the eyes with approved goggles. There are no storage regulations; however, it should be stored in a dry place as heat is released upon solution in water and dry ferric chloride will not catalyze the chlorination reaction.

E. Lime (Code 38800)(Calcium Oxide)

T.L.V. = 10 Mg/M³ Nuisance Dust

1. Description: Fine white or slightly gray powder.
2. Formula: CaO
3. Toxic Hazard Rating:

Acute Local: Irritant 3; Ingestion 1, Inhalation 3
Acute Systemic: Ingestion 2; Inhalation 3; Skin Absorption 0.
Chronic Local: Irritant 3; Inhalation 3
Chronic Systemic: Ingestion 2; Inhalation 2; Skin Absorption 0.

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III. TOXICITY

E. Lime (Continued)

4. Toxicology: Has a caustic reaction and, therefore, is irritating to the skin. As a dust it can cause dermatitis and irritation of the eyes and mucous membranes. It is a general nuisance type of dust.
5. Fire Hazard: None
6. Explosion Hazard: Virtually none.
7. Handling: Dust respirator, adequate protective clothing, including rubber coated gloves, optional rubber full cover apron and full cover plastic goggles should be used when handling lime (dust). Adequate ventilation and dust removal equipment should be used in the handling area.

Lime is added to the stills to neutralize any liberated HCl and prevent sublimation of the FeCl_3 catalyst. It is handled in 50# bags.

F. Nitrogen (Code 43101)

TLV = Simple asphyxiants. Oxygen content of air must be 18% or higher (equivalent to a partial pressure of 135 mm Hg.)

1. Description: Colorless gas.
2. Formula: N_2
3. Constants: Mol. Wt. 28.02; M.P. - 210°C ;
B.P. - 195.8°C ; Density 1.2506 gr/liter at 0°C .
4. Toxicity: None. In high concentrations, it is an asphyxiant.

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