

**O R G A N I C
C H E M I C A L S D I V I S I O N
R E S E A R C H**

Report

REPORT NO. - P-1621

JOB NO. - 2-21-760.01-1754005

TENTATIVE PROCESS
ON
REFINING OF MCS 1109

DATE - June 15, 1971

WRITTEN BY - D. R. Cova

Monsanto

ST. LOUIS, MISSOURI

NEV 025019

PLAINTIFF'S
EXHIBIT

1468

738274

Appendix B

"Safety and Toxicity Data"

Taken in part from The Standard Manufacturing Process
for the Manufacture of Aroclors, in Dept. 246,
W. G. Krummrich Plant. New material has been added
and some changes were made in the old material.

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SAFETY & TOXICITY DATA

Safety Equipment

The following is a list of safety equipment (personal and departmental) required in department 246.

1. Fire extinguishers:

- A. Dry Chemical (3) - Southwest corner Bldg. CR - Main Floor.
 - West wall at top of stairs of Second Floor.
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- B. Carbon Dioxide Snow - Southwest corner of Bldg. CR, ground level.

2. Chlorine Gas Masks (4) - Southwest corner, second floor

- Control room, second floor
- East side, outside control room
- Wall, Southwest corner of sprinkler house, main floor.

3. Scott Air Masks - West of Lean-To

4. Safety Showers (2) - Southeast corner of Bldg. CR, ground level.

- Southeast corner of Bldg. CR, 2nd Floor.

5. Davis Vapometer

6. Eye Baths

7. Sprinkler System

Safety Precautions

The following are safety precautions followed in the operation of department 246.

1. Safety Equipment of Employee

Each employee has the following safety equipment: (1) Hard hat
(2) Safety glasses (3) Goggles (4) Rubber and canvas gloves
(5) Rubber overshoes. Special equipment may be issued as necessary for performing a particular job in a safe manner.

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SAFETY & TOXICITY DATA (Cont'd.)

Safety Precautions (Cont'd.)

2. Sampling of Crude Aroclor

The samples of Aroclor taken during the chlorination reaction are hot (~~190~~¹⁵⁰°C.). Precaution must be taken to avoid skin contact of samples and inhalation of Hydrogen Chloride, Chlorine and Aroclor vapors.

3. Fires

Fires may result from the ignition of leaking gas, Xylene, Diphenyl, rags, paper, wood, etc. Automatic fire extinguishers and sprinklers have been installed to combat fires.

4. Explosions

Explosions may be caused from accumulated pockets of natural gas or a rapid burning of Diphenyl in a closed container such as a Chlorinator. Chlorinators are equipped with a 10" diameter pressure relief line with a rupture disc made to burst at 22 psi in case Diphenyl within the Chlorinator ignites.

5. Toxicity

Toxicity does not present a serious problem. However, a complete daily change of clean clothes is supplied to each person and time is allotted at the end of each shift to take a bath. Instructions are also issued to avoid actual skin contact with Biphenyl and Aroclor as much as possible and to wash hands and face before eating.

6. Miscellaneous

There are many accidents that can occur that may be classified as health and safety hazards. These accidents may result from such things as broken process lines, acid leaks, steam leaks, etc.

The worst inherent hazards are as follows:

1. Free Chlorine from ruptured line or major leak.
2. HCl Gas from ruptured line or major leak.
3. Dropping bottoms from stills.
4. Hot Aroclor & Diphenyl.

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Crude Aroclor 1105

Toxicity: This material has a crystallizing point of 54°C. Since it is an Aroclor, it should have a medium toxicity range for liquid ingestion and high toxicity for vapor inhalation. The maximum allowable concentration (M.A.C.) is 1 mg/cubic meter.

Fire Hazard: Since this material contains high concentrations of biphenyl, it is very flammable and will burn when exposed to heat or flame or oxidizing materials.

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SAFETY & TOXICITY DATA (Cont'd.)

Other Hazards: This material can cause dermatitis, systemic poisoning from the fumes, and yellow atrophy of the liver. There are skin, mucous membranes and eye hazards encountered in handling this material.

Treatment and Antidotes: Call a physician and remove patient from fumes.

Storage and Handling: Protect the skin, lungs, and eyes by wearing approved protective clothing, respirator, and goggles. People who handle this material at elevated temperatures should have medical supervision, and the air should be sampled to insure compliance with M.A.C. There are no special storage restrictions under normal conditions except store in a ventilated area.

Shipping: There are no special shipping restrictions.

FERRIC CHLORIDE (FeCl₃)

Toxicity: This material is a solid under normal conditions and is non-toxic or has a rating as low.

Fire Hazard: There is no fire hazard under normal conditions, but it will emit toxic fumes at high temperatures.

Other Hazards: Some people are allergic to this material and may develop skin rash, and there is an eye hazard.

Treatment and Antidotes: Call a physician.

Storage and 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.

Shipping: There are no shipping restrictions.

DIPHENYL (C₆H₅C₆H₅)

Toxicity: This material is a solid at normal conditions and is medium toxic. The M.A.C. of vapor is 2 mg/cubic meter of air. If ingested the lethal dose is 2.4 g/Kg of body weight. The fumes are not dangerously deadly, but they are poisonous over a prolonged time.

Fire Hazard: Diphenyl is very flammable and will burn when exposed to heat or flame or oxidizing materials.

Other Hazards: Diphenyl is not too corrosive to skin, but it will affect the eyes.

SAFETY & TOXICITY DATA (Cont'd.)

DIPHENYL ($C_6H_5C_6H_5$) (Cont'd.)

Treatment and Antidotes: Wash eyes with water and get the patient to fresh air. Try to get patient to vomit, and call a physician.

Storage and Handling: This material can be stored in steel containers away from fire hazards and oxidizing agents. Wear suitable clothes and approved goggles when handling diphenyl.

Shipping: Ship in cars or other suitable containers with a red warning label of flammability.

LIME $Ca(OH)_2$

Toxicity: Lime is not dangerously toxic, and it is regarded as more of a nuisance. This material is a solid or slurry.

Fire Hazard: This material is not flammable.

Other Hazards: Lime is very hazardous to the eyes. It will burn the skin also, and the dust will affect the mucous membranes.

Treatment and Antidotes: Flood eyes and skin with large quantities of water. If lime is ingested, get patient to vomit and call physician.

Storage and Handling: Lime can be stored in steel containers, and people should wear protective clothing, respirators, and rubber or chemical safe goggles when handling lime.

Shipping: There are no special restrictions for shipping, but the containers should have a white label, a caustic warning.

SAFETY & TOXICITY DATA (Cont'd)

HYDROGEN CHLORIDE (HCl)

Toxicity: This material is a gas under normal conditions and is very toxic. The M.A.C. is 5-10 ppm and a concentration of 1500-2000 ppm would be fatal to humans in a few minutes.

Fire Hazard: There is no fire hazard under normal conditions, but wet gas reacts with some metals to form hazardous hydrogen.

Other Hazards: This material is hazardous to teeth, skin, eyes, and mucous membranes.

Treatment and Antidotes: Wash profusely with water, if injected, eat chalk, magnesium hydroxide, egg whites, and milk, and also administer oxygen. Call a physician.

Storage and Handling: This material should be stored in a cool, well ventilated area away from oxidizing agents. This material can be stored in rubber lined, glass, or tantalum vessels. People handling this material should wear suitable clothing like rubber aprons, shoes, and gloves. Also rubber goggles or chemical safe grades and approved pack or canister gas masks.

Shipping: Shipping containers must have a white warning label and a non-flammable label. Ship in appropriate containers such as rail car or carboy.

CHLORINE (Cl₂)

Toxicity: This material is a gas under normal conditions and is very toxic. The M.A.C. is .35 to 2 ppm. A concentration of 1000 ppm would be rapidly fatal. Least concentration with detectable odor is 3.5 ppm.

Fire Hazard: There is no fire hazard under normal conditions, but there is an explosion hazard if chlorine is mixed with a strong reducing agent such as hydrogen or hydrocarbons at high temperature.

Other Hazards: This material causes eye, skin, and mucous membrane irritation.

Treatment and Antidotes: The patient should be given oxygen immediately and treated for shock. Call a physician.

Storage and Handling: This material should be stored in a ventilated and cool place away from fire hazards. When handling, wear a gas mask or approved respirator, clothing and rubber or chemical safe goggles. In strong chlorine concentrations, wear canister gas masks, Scott air pack, or oxygen breathing apparatus.

Shipping: The shipping containers must have a green gas label and a non-flammable label on. Ship in steel cars or cylinders.

SAFETY & TOXICITY DATA (Cont'd)

MCS 1109 (Monochlorobiphenyl)

Toxicity: This material is a liquid under normal conditions. It is an Aroclor and so should have a medium toxicity range for liquid ingestion and high toxicity for vapor inhalation. The maximum allowable concentration is 1 mg/cubic meter.

Fire Hazard: This material has some flammability. It has a flash point (open cup) of 138°C.

Other Hazards: This material can cause dermatitis, systemic poisoning from the fumes, and yellow atrophy of the liver. There are skin, mucous membranes and eye hazards encountered in handling this material.

Treatment and Antidotes: Call a physician and remove patient from fumes.

Storage and Handling: Protect the skin, lungs, and eyes by wearing approved protective clothing, respirator, and goggles. People who handle this material at elevated temperatures should have medical supervision, and the air should be sampled to insure compliance with M.A.C. There are no special storage restrictions under normal conditions except store in a ventilated area.

Shipping: There are no special shipping restrictions.

EXHIBIT NO. **1469**

	GENERAL ELECTRIC	WESTINGHOUSE	MONSANTO
AUTHENTICATED:			
YES			
NO			
NO KNOWLEDGE			
NORMAL BUSINESS ACTIVITY:			
YES			
NO			
NO KNOWLEDGE			
NO SUSPICION OF AUTHENTICITY:			
YES			
NO			
STIPULATED OTHERWISE:			
YES			
NO			
NO KNOWLEDGE			

O R G A N I C
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R E S E A R C H

Report

REPORT NO. P-1620

JOB NO. 2-21-760.01-1754059

TENTATIVE PROCESS
FOR
THE PREPARATION OF AROCLOR 1105

DATE - June 18, 1971

WRITTEN BY Q. E. Thompson

Monsanto

ST. LOUIS, MISSOURI

NEV 025028



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TOXICITY AND HAZARDS

Safety of operations in the Aroclor plant depends on the individual operator. Materials being handled and operations must be observed closely to guard against the following:

<u>Cause</u>	<u>Action to Prevent</u>
<u>Chlorine Gas</u>	
Chlorine gas is a very toxic corrosive gas. Leaks or high pressure can occur to liberate it.	Report chlorine gas exposure immediately for treatment with antidote. Milk may be used in mild cases to relieve throat irritation. Oxygen from the resuscitator in the Dispensary is available.
	Keep gas mask in good condition. Keep a good canister in the mask. Use these type masks only in chlorine concentrations to 2-3% chlorine in air.
	Use a Scott Air Pak in concentrations of chlorine gas above 3% in air. One unit is available outside the west well of the drumming shed.
	If caught in chlorine gas without mask, hold your breath and go cross wind until you are out of range of the gas. Place a handkerchief over your nose in small quantities of chlorine.
	Report all chlorine leaks for repair immediately. Make temporary repairs with tape, if possible.
	In case of a major chlorine leak, the source of chlorine gas must be stopped.
	Notify the chlorine plant immediately if the pressure on the chlorine manifold exceeds 30 psig.

<u>Cause</u>	<u>Action to Prevent</u>
<u>Thermal Burns</u>	
Contact with hot uninsulated product lines at the chlorinators and still areas.	Know that contact with equipment and product will cause a thermal burn due to the high temperatures. Make changes in operations with this hazard in mind.
Contact with uninsulated steam lines and open steam.	Know the first aid treatment for burns.
Contact with hot Aroclors from broken lines or leaks.	Wear gloves and long sleeve shirts with the sleeves rolled down when operating. Gloves and clothing can make the difference between first and second degree burns.
Contact with open flames at Therminol furnace or from heating lines in the department.	Report uninsulated lines for repair of insulation.
	Use only steam lines with hose and hose clamps in good condition. Use the cotter pin provided at the hose station to hold hose in place.
	The following operations are hazardous and should be done with care:
	1) Catching samples at the chlorinator sampling points.
	2) Drawing bottoms at stills.
<u>Explosion</u>	
An explosion could occur in the chlorinators by slugging liquid chlorine to the distributor. Slugs of liquid chlorine could react fast enough to cause excessive pressure in the vessel. A rupture of the chlorinator rupture disc could occur.	Observe operation of the chlorine vaporizer. Pipe lines from the vaporizer will be frosted if liquid chlorine is present.
	In case chlorine feed lines are frosted, close chlorine feed valve to the vaporizer. Check steam addition to the vaporizer. Do not start up until source of trouble has been located.
	Observe temperature of the chlorinator periodically and be sure it is not too hot. A high temperature alarm and shutdown is provided.

<u>Cause</u>	<u>Action to Prevent</u>
<u>Falls</u>	
Slipping on cement floors, stairs, Aroclor on floor, ice conditions; tripping over objects (hose, pipe, valve handles, etc.); or losing footing on ladders, etc., can cause falls.	The majority of minor, serious, and near-miss injuries in the Aroclor Department are the result of falls. Prevention is always within the ability of the operator by use of expert operating practices. The following items should be done: 1) Return hose to rack after using. 2) Keep operating areas clean of all foreign objects. 3) Return ladders to racks when not in use. 4) Keep gloves on and hands out of pockets, especially going up stairs. 5) Place guards around any area that presents a hazard that should be guarded. Poor lighting due to burned out bulbs should be corrected at once. Poor lighting due to inadequate facilities should be reported. Spills must be cleaned up immediately following their occurrence. Spills are to be reported on the log sheets.
<u>Fires</u>	
Biphenyl ignition.	Area must be clear of trash or flammable materials. Use trash skips and cans.
Chlorine problems in the vaporizer allowing reaction with steam to release hydrogen.	Smoke only in areas so designated.
Therminol furnace and still burner backfire.	Use spark producing equipment only with a fire permit and proper inspection.

<u>Cause</u>	<u>Action to Prevent</u>
<u>Fires (continued)</u>	
Wood, rags, or paper on hot lines.	Use care in lighting gas torch or the still furnaces.
Sparks from welding apparatus or open flames.	Observe visitors in the plant and be sure they observe safety rules.

Chemical Handling

Chlorine Gas

This is a corrosive gas which is toxic. Leaks or back pressure can occur and liberate chlorine gas in the area. Operators should have their cartridge type respirators handy at all times while in the area. Use of gas masks is explained in Section 1 - Chlorine Gas.

If you are caught without a gas mask, and large amounts of chlorine gas are liberated, hold your breath and go cross wind until you are out of range of the gas. Once out of the area, obtain an emergency gas mask and return to the area and correct the trouble.

A victim of chlorine gas fumes must be removed as quickly as possible from the gaseous area. Place patient on his back with head and back elevated. Milk may be used in mild cases as a relief from throat irritation. If the patient has stopped breathing, start artificial respiration immediately.

Biphenyl

Biphenyl is a flammable material which will burn. Burning should not be done in the presence of biphenyl or biphenyl vapors. The melting point is 68.7°C., and the auto ignition temperature is 258°C. Inhalation of biphenyl fumes is not recommended, since it can cause a drugged effect on the person.

Ferric Chloride

Ferric chloride is a black-brown solid. It causes only slightly irritating effects on the skin or mucous membranes. When heated, it will decompose and release toxic fumes of chlorine. It will react with water to produce toxic and corrosive HCl fumes.