

REV
8(E)

CELLULOSE PRODUCTS PLANT
INDUSTRIAL HYGIENE REPORT
1983

DO 096344
CONFIDENTIAL

CONTENTS

- I. GENERAL
- II. METHYL CHLORIDE, PROPYLENE OXIDE, AND
DIMETHYL ETHER SURVEYS
 - A. SURVEY REPORTS
- III. NOISE SURVEYS
 - A. SURVEY REPORTS
- IV. CONSEQUENCES OF EXPOSURE TO TOXIC AMOUNTS
 - A. SUMMARIES

DO 096345
CONFIDENTIAL

I. GENERAL

INDUSTRIAL HYGIENE SURVEYS DONE IN THE CELLULOSE PRODUCTS PLANT FOR 1983 INCLUDE SURVEYS FOR METHYL CHLORIDE, PROPYLENE OXIDE, AND DIMETHYL ETHER IN THE REACTOR AND WASH AREAS. ALSO, A NOISE SURVEY WAS CONDUCTED WHERE CERTAIN OPERATORS IN THE PLANT WORE AN AUDIO COSIMETER TO DETERMINE AVERAGE NOISE LEVELS THEY WERE EXPOSED TO DURING THEIR WORK DAY.

SUMMARIES, DATA SHEETS AND CONCLUSIONS FOLLOW.

II. METHYL CHLORIDE, PROPYLENE OXIDE, AND
DIMETHYL ETHER SURVEYS

PERSONNEL MONITORING WAS DONE IN THE REACTOR AND WASH AREAS TO ACCUMULATE DATA ON EXPOSURES TO METHYL CHLORIDE, PROPYLENE OXIDE AND DIMETHYL ETHER.

THE ACTUAL SURVEY REPORTS FOLLOW:

AS A POINT OF REFERENCE, BELOW IS A CHART SHOWING THE TLV (THRESHOLD LIMIT VALUES) FOR THE THREE COMPONENTS MONITORED:

<u>COMPONENT</u>	<u>TLV (THRESHOLD LIMIT VALUE)</u>
PROPYLENE OXIDE	20 PPM
DIMETHYL ETHER	400 PPM
METHYL CHLORIDE	50 PPM

III. NOISE SURVEYS

IN NOVEMBER, 1983, PERSONNEL NOISE SURVEYS WERE CONDUCTED IN THE CELLULOSE PLANT. OPERATORS WORKING IN DIFFERENT AREAS OF THE PLANT WERE ASKED TO WEAR AN AUDIO DOSIMETER, WHICH MEASURES NOISE LEVELS AS THE OPERATOR GOES ABOUT HIS JOB DURING THE DAY. THE TLV (THRESHOLD LIMIT VALUE) FOR NOISE IS 85 DBA, AS STATED IN THE ATTACHED "CONSEQUENCES OF OVER-EXPOSURE TO NOISE" SHEET.

THE ACTUAL SURVEY REPORTS FOLLOW: ' ALSO ATTACHED IS A COPY OF THE AREA NOISE SURVEY CONDUCTED IN 1982. THIS SHOWS NOISE LEVELS AROUND CERTAIN EQUIPMENT THROUGHOUT DIFFERENT AREAS OF THE PLANT.

CONSEQUENCES OF OVER-EXPOSURE

COMPOUND: NOISE

PROLONGED AND REPEATED EXPOSURE TO LEVELS EXCEEDING 90 dB-A MAY CAUSE SEVERE DAMAGE TO THE NERVES IN THE INNER EAR.

2 - 3% OF POPULATION MAY BE AFFECTED BETWEEN 85 & 90 dB-A.

THE INITIAL EFFECT IS TO REDUCE THE ABILITY TO HEAR SOUNDS IN THE HIGH FREQUENCY RANGE.

IF UNCHECKED, THE HEARING LOSS CAN EXTEND TO THE FREQUENCIES IN THE NORMAL SPEECH RANGE.

METHODS OF CONTROL

DING - 85 dB-A - TO PREVENT HEARING LOSS FOR EXPOSURES OF MORE THAN EIGHT HOURS PER DAY.

DO 096349
CONFIDENTIAL

NOISE SURVEY

	<u>DBA</u>		<u>DBA</u>
<u>WASH</u>		<u>REACTORS</u>	
F-1A	99	R-1A	90
HY-1	93	R-1B	90
P-7C	96	R-1C	90
S-5B	90	R-1D	90
1CY-3	91	1R-1A	94
C-19A	91	1R-1B	92
H0-4A	92	1E-1A	89
H0-4B	92	R-1A chute	91
CY-22	99	3rd floor	
		over R-1A,B,C,D	92
<u>BLENDER ROOM</u>		<u>AGER COOLER</u>	
A2FA	87	B-4	86
A2A	88	B-5	86
C-36	89	B-3	87
<u>PACKAGING</u>		<u>GRINDERS</u>	
Shakers	82	G-3A	92
BDH-60	81	G-3B	92
PM-100	82	G-3C	94
		G-3D	95
<u>BALL MILLS</u>	105	DK-1 (btm floor)	95
<u>SILOS</u>	91	T-1A	85
		T-51	85

IV. CONSEQUENCES OF EXPOSURE TO TOXIC AMOUNTS

THE FOLLOWING IS A LIST OF MATERIALS USED IN THE CELLULOSE PRODUCTS PLANT AND THE CONSEQUENCES OF EXPOSURE TO TOXIC AMOUNTS.

ALSO, THE AREA THE MATERIAL IS USED IN AND WHATEVER REASON IT IS USED IS LISTED AT THE BOTTOM OF THE SHEET.

COMPOUND: METHANOL

SYNONYM: METHYL ALCOHOL.

ODOR: DETECTABLE AT 2000 PPM; ODOR IS A POOR WARNING PROPERTY.

ING: TLV AT 200 PPM.

EYES: LIQUID CAN CAUSE IRRITATION AND TEMPORARY DAMAGE TO THE CORNEA. THE VAPOR MAY BE IRRITATING AT HIGH CONCENTRATIONS (ABOVE 2000 PPM).

SKIN: PROLONGED OR REPEATED CONTACT WITH THE LIQUID MAY CAUSE DRYING OF THE SKIN AND DERMATITIS. THE LIQUID MAY BE ABSORBED THROUGH THE INTACT SKIN AND DERMATITIS. THE LIQUID MAY BE ABSORBED THROUGH THE INTACT SKIN IN TOXIC AMOUNTS.

INGESTION: INGESTION MAY CAUSE NAUSEA, HEADACHE, DIZZINESS, BLURRED OR LOSS OF VISION, UNCONSCIOUSNESS AND/OR DEATH.

INHALATION: ACUTE -- IRRITATION TO THE RESPIRATORY TRACT, NAUSEA, HEADACHE, DIZZINESS, IMPAIRMENT OF VISION.
CHRONIC -- HEADACHE, CENTRAL NERVOUS SYSTEM DEPRESSION, IMPAIRMENT OF VISION.

REFERENCES: PATTY, VOLUME 11, 1963; "CHEMICAL HAZARDS OF THE WORKPLACE," 1978; INDUSTRIAL HYGIENE DATA SHEET.

AUTHOR: R. A. DOMMER

CHECKED BY: R. L. DANIEL, INDUSTRIAL HYGIENE
R. V. JOHNSTON, TOXICOLOGY
A. L. MCDOWELL, MEDICAL

ISSUE DATE: REVISED 5/5/80

<u>AREA USED</u>	<u>REASON</u>
LAB	INGREDIENT IN INDICATOR FOR WATER SOFTENERS TEST USED IN PAINT REMOVER TEST FOR F4M

DO 096352
CONFIDENTIAL

CONSEQUENCES OF OVEREXPOSURE

COMPOUND: ACETONE

OTHER NAMES: 2-PROPANONE

EXPOSURE LIMIT: 1000 PPM (DOW 1-E3)
1000 PPM (OSHA)

EYES: BURNING STINGING SENSATION AT HIGH CONCENTRATIONS, LIQUID MAY CAUSE TEMPORARY TISSUE DAMAGE.

SKIN: REPEATED, PROLONGED CONTACT MAY CAUSE REDNESS AND DRYNESS FROM EXTRACTION OF SKIN FATS.

INHALATION: ACUTE-- NAUSEA AND VOMITING, CENTRAL NERVOUS SYSTEM DEPRESSION (DIZZINESS, STUPOR, MENTAL CONFUSION) AT HIGH CONCENTRATIONS.
CHRONIC-- DISCOMFORT FROM NOSE AND THROAT IRRITATION.

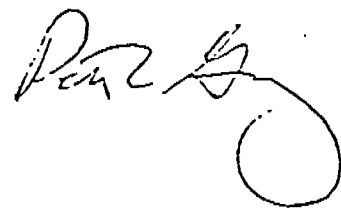
AREA USED

REASON

LAB

DRYING AND CLEANING GLASSWARE AROUND SINK

BY: E. E. BOSCHE'
REVISED 12-13-77

REVIEWING PHYSICIAN: 
DATE: 12/23/77

THE DOW CHEMICAL COMPANY

WILMINGTON, DELAWARE

DATA SHEET OF PROPERTIES, HEALTH HAZARDS, AND PRECAUTIONS FOR SAFE HANDLING OF MATERIALS

NETS. 1-5-2

MOLECULAR FORMULA	CH ₂ O ₂	NAME	Formic acid
MOLECULAR WEIGHT	46.02	INDUSTRIAL HYGIENE STANDARD	5 ppm
SYNONYMS			

10% and 80% aqueous solutions

PHYSICAL AND CHEMICAL PROPERTIES	BOILING POINT	°C	°F	EXPLOSIVE LIMITS (% VOL. IN AIR)	FLASH POINT	°C	°F	IGNITION TEMP.	°C	MELTING POINT	°C	VAPOR PRESS. mm. Hg.
	CORROSIVENESS (On Copper Sheet)				PHYSICAL STATE				COLOR			
	Very corrosive				Liquid				Clear			
	CHEMICAL REACTIVITY				CDOR (Include Concentration in Air)							
TOXIC PROPERTIES	Strong reducing agent				Very pungent							
	STABILITY (To Heat, Shock, Light)											
	Probably stable											
	CLASSIFICATION OF TOXIC PROPERTIES											
TOXIC PROPERTIES	EYE	☐	MAY CAUSE NO RESPONSE OR NO MORE THAN VERY SLIGHT TO SLIGHT TRANSIENT PAIN AND/OR SLIGHT TRANSIENT EYE IRRITATION AND/OR IRRITATION ON THE EYELIDS.	☒	MAY CAUSE SOME PERMANENT LOSS OF VISION (THIS INCLUDES DAMAGE TO CORNEA OR INTERNAL INJURY WHICH IS INCOMPLETELY HEALED ONE WEEK.)							
		☐	MAY CAUSE SUFFICIENT INJURY TO THE EYE TO RESULT IN LOSS OF TIME FROM WORK. (THIS INCLUDES DAMAGE TO THE CORNEA WHICH HEALS OR NEARLY HEALS IN A WEEK AND/OR CONSIDERABLE CONJUNCTIVAL IRRITATION WITH EDEMA.)	☒	VAPOR EXPOSURE MAY CAUSE SEVERE PAIN, AND/OR INJURY TO THE EYES.							
	SKIN	☐	SINGLE PROLONGED EXPOSURE (HOURS) CAUSES NO EFFECT. SEVERAL REPEATED PROLONGED EXPOSURES MAY OR MAY NOT CAUSE THE DEVELOPMENT OF SOME SLIGHT IRRITATION.	☐	SINGLE SHORT EXPOSURE (MINUTES) MAY CAUSE CONSIDERABLE IRRITATION AND/OR SINGLE PROLONGED OR FREQUENTLY REPEATED EXPOSURES CAUSE A BURN AND/OR MAY CAUSE SYSTEMIC INJURY, EVEN DEATH.							
		☐	SINGLE PROLONGED EXPOSURE MAY CAUSE SOME REDDENING OF THE SKIN. REPEATED PROLONGED CONTACTS MAY CAUSE APPRECIABLE IRRITATION, POSSIBLY A MILD BURN AND/OR MAY CAUSE APPRECIABLE SYSTEMIC INJURY DUE TO ABSORPTION.	☒	AN EXPOSURE RAPIDLY CAUSES SEVERE BURNS AND OR SERIOUS SYSTEMIC INJURY, EVEN DEATH.							
	INITIALATION	MIST	☐	NO SYSTEMIC INJURY EXPECTED. NO IRRITATION TO NOSE AND THROAT IN DUSTY OR MISTY ATMOSPHERES.	☒	NO MISTY ATMOSPHERE PAINFUL TO NOSE AND THROAT (NOT ABLE TO MOST PEOPLE) AND/OR EXPOSURE MAY CAUSE SERIOUS INJURY.						
			☐	THROAT AND NOSE IRRITATION IN A DUSTY OR MISTY ATMOSPHERE IS PAINFUL BUT NOT INTOLERABLE AND/OR PROLONGED OR REPEATED EXPOSURES MAY CAUSE SYSTEMIC INJURY.	☐	SHORT EXPOSURE (MINUTES) MAY CAUSE DEATH OR SERIOUS SYSTEMIC INJURY.						
(1) VAPOR		☐	EXPOSURES DO NOT CAUSE ANY EFFECTS OTHER THAN SOME VERY SLIGHT IRRITATION OR PAIN TO THE EYES OR RESPIRATORY PASSAGES AT THE MOST.	☒	EXPOSURES MAY CAUSE EXTREME DROWSINESS, AND/OR SERIOUS SYSTEMIC INJURY, AND/OR MAY CAUSE INTOLERABLE IRRITATION TO THE RESPIRATORY PASSAGES.							
☐	SINGLE EXPOSURES EXCEEDING 1/2 HOUR, OR FREQUENTLY REPEATED EXPOSURES OF SHORTER DURATION, MAY CAUSE SLIGHT ANESTHESIA AND/OR SLIGHT SYSTEMIC INJURY, AND/OR CAUSE APPRECIABLE, BUT NOT INTOLERABLE, IRRITATION OF RESPIRATORY PASSAGES.	☐	SHORT EXPOSURES MAY CAUSE UNCONCIOUSNESS, AND/OR SERIOUS SYSTEMIC INJURY, INCLUDING DEATH.									
		☐	EVEN VERY SHORT EXPOSURE WILL CAUSE SERIOUS SYSTEMIC INJURY OR DEATH.									
INGESTION	☒	AMOUNTS WHICH MAY BE SWALLOWED INCIDENTAL TO INDUSTRIAL HANDLING WILL NOT CAUSE INJURY. HOWEVER, IF SUBSTANTIAL QUANTITIES SHOULD BE SWALLOWED, MORE OR LESS SERIOUS EFFECTS MAY OCCUR.			☐	AMOUNTS WHICH MAY BE SWALLOWED INCIDENTAL TO INDUSTRIAL HANDLING AND USE MAY CAUSE SERIOUS INJURY.						

NETS

(1) Toxicity estimated (probably similar to acetic acid).

AREA USED

REASON

CHEMICAL MIX AREA

WHEN TREATING CHEMICALS ARE MIXED

LAB

WHEN TREATING CHEMICALS ARE ANALYZED

CONFIDENTIAL - FOR THE USE OF DOW EMPLOYEES ONLY

DO 096354
CONFIDENTIAL

COMPOUND: HYDROCHLORIC ACID

EYES: CONTACT WITH DILUTE LIQUID OR CONCENTRATED VAPOR CAN RESULT IN EXTREME IRRITATION. CONCENTRATED LIQUID CONTACT CAN CAUSE TISSUE DAMAGE TO THE CORNEA WITH POSSIBLE PERMANENT IMPAIRMENT OF VISION.

SKIN: CONCENTRATED LIQUID CAN CAUSE BURNS OR ULCERATION. PROLONGED CONTACT WITH DILUTE SOLUTIONS CAN CAUSE SEVERE IRRITATION. MISTS AND FUMES CAN BE PARTICULARLY IRRITATING TO THE SKIN OF THE FACE.

INHALATION: ACUTE -- IMMEDIATE COUGH AND BURNING SENSATION IN THE NOSE AND THROAT. BREATHING CONCENTRATED VAPORS OR MISTS MAY RESULT IN BLEEDING FROM THE NOSE AND GUMS. EFFECTS ARE USUALLY LIMITED TO INFLAMMATION.

CHRONIC -- PROLONGED OR REPEATED EXPOSURE CAN RESULT IN ULCERATION OF THE NOSE AND THROAT AND TIGHTNESS IN THE CHEST.

IHG: TLV: CEILING OF 5 PPM (7 MG/M³) SET TO PREVENT SERIOUS PULMONARY INJURY, ALTHOUGH IRRITANT EFFECTS MAY STILL BE PRESENT.

ODOR: THRESHOLD AT 5 PPM.

REFERENCES: FATTY, VOLUME II; TLV DOCUMENTATION, 1977; "CHEMICAL HAZARDS OF THE WORKPLACE," 1978.

AUTHOR: W. E. LEDFORD

CHECKED BY: C. E. HALPHEN, INDUSTRIAL HYGIENE
J. E. BETSO, TOXICOLOGY
M. F. CURRIER, MEDICAL

DATE ISSUED: 5/5/80

AREA USED

REASON

LAB

DILUTE SOLUTIONS USED FOR CHEMICAL IRON ANALYSIS

DO 096355
CONFIDENTIAL

SAFETY INFORMATION BULLETIN

EFFECTS OF INHALATION OF NITROGEN

Nitrogen along with a few other gases are classified as simple asphyxiants. Others in this group would be methane, ethane, acetylene, carbon dioxide, nitrous oxide, hydrogen, argon, neon, helium, and other rare gases.

We are primarily concerned here with nitrogen.

At sea level the air we breath is composed of 20-21% oxygen. With each average breath of 500 ml. about 350 ml. is exchanged in the lungs. It is then taken up by the blood continuously and carbon dioxide is released continuously by body cells and exhaled.

With such circumstances, ~~after only the inh. breath of 100% nitrogen (atmosphere devoid of oxygen), an individual will immediately become unconscious.~~

When the oxygen content of air falls slowly, the symptoms are more gradual, as shown on the following page.

Oxygen % In Air (Approximately 21% Normal)

At Rest Signs and Symptoms

12 - 18%	Respirations deeper; pulse up; co-ordination poor
10 - 12%	Deep-fast respiration; giddiness; poor judgement; lips blue
8 - 10%	Nausea; vomiting; unconscious; ashen face
6 - 8%	8 minutes - 100% fatal; 6 minutes - 50% fatal; 4 minutes - all recover with treatment
4%	Coma in 40 seconds; convulsions; respiration ceases
0%	Individual immediately becomes unconscious; will recover if good air is immediately available

Rescue

When an unconscious person is found near an area where nitrogen is being used as a pad, nitrogen inhalation should immediately be suspected. If the individual is in an enclosed space, rescue should be attempted only with an air-pac or supplied air mask. The rescuer should be confined with safety line held by an assistant. Full-face gas masks with canister type filters must not be used. (This type mask does not generate oxygen.)

NITROGEN IS USED IN THE SILOS:

HO-30's
HO-20's
HO-25's

NOTE: THIS INFORMATION ON THE EFFECTS OF NITROGEN APPLY TO ANY ATMOSPHERE DEVOID OF OXYGEN - NOT JUST NITROGEN.

the visual field with dilatation of the pupils and some impairment in central vision is the most constant criterion of oxygen toxicity. Circulatory changes indicative of peripheral vascular constriction are associated with the visual impairment and culminate during the fourth hour in an abrupt rise in systolic and diastolic blood pressure, increase in pulse rate, and extreme pallor. At this stage the subjects experience dizziness and a feeling of impending collapse, with partial stupor. Rapid and complete recovery, attended by a feeling of alertness and stimulation, results within an hour after air is substituted for oxygen.

Effects on Dogs. Among dogs⁹ inhaling pure oxygen at atmospheric pressure, oxygen poisoning begins to develop after 36 hours, causes distress within 48 hours, and death in 60 hours. Ninety per cent oxygen in air requires double the exposure period for similar results; in 80 per cent oxygen in air the animals did not die but were ill at the end of a continuous exposure of 1 week. A decline in oxygen saturation of the blood, rise in hemoglobin, lung congestion and edema, right heart failure, and liver congestion were frequent findings in oxygen poisoning.

4. Fire Hazards of Increased Concentrations

In the use of air containing oxygen in concentrations above 21 per cent, or air at increased pressures, all materials are more readily oxidized than in the normal atmosphere and therefore will ignite more easily and burn more rapidly, thus presenting a greater fire hazard. Great care must be exercised to assure that cylinders, gages, valves, or lines to be used with compressed oxygen do not become contaminated with traces of oil or other readily oxidizable material. If such contamination exists, explosive oxidation may occur when contact is made with the compressed oxygen.

Oxygen Deficiency

1. Occurrence

Oxygen deficiency is of much more concern in industry than are high concentrations or high pressures of oxygen. It may be encountered in numerous situations such as in tanks, vats, holds of ships, silos, mines, or in any poorly ventilated area where the air may be diluted or displaced by gases or vapors of volatile materials, or where the oxygen may be consumed by chemical or biological reaction processes.

2. Determination in the Atmosphere

The analysis of the atmosphere for its oxygen content may be done with the Haldane or Orsat¹⁰ gas-analysis apparatus. Safety lamps¹¹ are used for detecting

⁹ J. R. Paine, A. Keys, and D. Lynn, *Am. J. Physiol.*, 133, 406 (1941).

¹⁰ G. A. Burrell and F. M. Seibert, revised by G. W. Jones, *U. S. Bur. Mines Bull. No. 197* (1926).

¹¹ A. B. Hooker, E. J. Coggeshall, and G. W. Jones, *U. S. Bur. Mines Rept. Invest. No. 3327* (1937).

COMPOUND: Chlorothene* NU Solvent

SYNONYMS: Inhibited Methyl Chloroform; Inhibited 1,1,1-Trichloroethane;

FORM: Liquid (at room temperature)

EYES: Mild to moderate irritation but no permanent injury expected.

SKIN: Repeated or prolonged contact can cause irritation and dryness of the skin. May cause a burn if confined to the skin.

INGESTION: Low acute oral toxicity. Amounts swallowed incidental to industrial handling are not likely to cause injury. Ingestion of large amounts could cause serious injury.

INHALATION: Excessive exposure may cause central nervous system depression, incoordination and poor judgment which, in turn, may cause a serious accident. Exposure to extremely high vapor concentrations (such as entry into tanks or other vessels) may cause drowsiness, unconsciousness and even death.

IHG: 350 ppm TWA; 450 ppm Excursion (ACGIH TLV)

AUTHOR: A. W. Schoffer

REVIEWED BY: M. G. Swank, Industrial Hygiene
J. E. Betso, Toxicology
H. E. Newby, Medical

ISSUE DATE: R-11/30/81

AREA USED

REASON

SHOP AREA

CLEANING OF VARIC
MECHANICAL PARTS

*Trademark of The Dow Chemical Company

DOW CONFIDENTIAL

DO 096358
CONFIDENTIAL

CONSEQUENCES OF EXPOSURE TO TOXIC AGENTS

COMPOUND: PROPYLENE OXIDE

SYNONYMS: 1,2-EPOXYPROPANE

FORM: AT ROOM TEMPERATURE: LIQUID; WATER WHITE

ODOR: SWEET; AVERAGE THRESHOLD AT 200 PPM

INH: 20 PPM TWA; 100 PPM EXCURSION

EYES: RAPID EVAPORATION OF THE LIQUID CAN CAUSE FROSTBITE TYPE INJURY TO THE CORNEA. VERY HIGH LEVELS (APPROXIMATELY 500 PPM) CAN CAUSE IRRITATION AND WATERING OF THE EYES.

SKIN: RAPID EVAPORATION OF LARGE AMOUNTS OF LIQUID CAN CAUSE FROSTBITE TYPE BURNS. PROLONGED OR CONFINED CONTACT CAN CAUSE PAIN, IRRITATION AND BLISTERING. DILUTE SOLUTIONS ON CONTACT WITH MOIST SKIN ARE MOST LIKELY TO CAUSE IRRITATION. REPEATED CONTACT COULD LEAD TO SENSITIZATION (ALLERGIC RESPONSES TO EVEN LOW VAPOR LEVELS).

INHALATION: ACUTE -- MAY CAUSE RESPIRATORY IRRITATION AND LUNG INJURY; CENTRAL NERVOUS SYSTEM DEPRESSION (DIZZINESS, CONFUSION, NAUSEA) MAY ALSO OCCUR, BUT AT HIGHER LEVELS (APPROXIMATELY 4000 PPM).

CHRONIC -- MAY CAUSE RESPIRATORY IRRITATION AND A RESULTING INCREASE IN RESPIRATORY PROBLEMS.

INGESTION: LARGE AMOUNTS COULD CAUSE GASTRIC IRRITATION AND SOME LIVER INJURY. NOT LIKELY TO BE INGESTED IN TOXIC AMOUNTS FROM ORDINARY HANDLING.

AUTHOR: G. H. FLORES

CHECKED BY: R. L. DANIEL, INDUSTRIAL HYGIENE
J. D. BUREK, TOXICOLOGY
M. F. CURRIER, MEDICAL

ISSUE DATE: REVISED JULY 18, 1980

AREA USED REASON

REACTOR AREA SOME EXPOSURE WHEN SAMPLES ARE TAKEN DIRECTLY FROM REACTO
LAB WHEN GAS SAMPLES ARE ANALYZED

DO 096359
CONFIDENTIAL

MATERIAL: Dimethyl ether

SYNONYMS: Methyl ether, methyl oxide,
wood ether

FORM AT ROOM TEMPERATURE: Gas

EYES: No irritation from vapors.
liquid in eye probably painful
but damage reversible.

SKIN, SKIN ABSORPTION: Liquid contact may cause
frostbite type response
because of rapid vaporization.

INHALATION: Low toxicity from short term
exposure. Weak anesthetic
effect and unpleasant suffocating
sensation from high concentrations.
Long term exposure effects
unknown.

INGESTION: Improbable.

INDUSTRIAL HYGIENE GUIDE: 400 ppm

ODOR THRESHOLD: Average 247 ppm (range 15-530)

<u>AREA USED</u>	<u>REASON</u>
REACTOR AREA	SOME EXPOSURE WHEN SAMPLES ARE TAKEN DIRECTLY FROM THE REACTOR
LAB	WHEN GAS SAMPLES ARE ANALYZED
REFERENCE:	Patty, data sheet, Dow toxicology files
AUTHOR/DATE:	C. L. Baldwin, 1/9/77
REVIEWING PHYSICIAN:	D. J. Ducommun

CONSEQUENCES OF EXPOSURE TO TOXIC AGENTS

COMPOUND: PROPYLENE OXIDE

SYNONYMS: 1,2-EPOXYPROPANE

FORM: AT ROOM TEMPERATURE: LIQUID; WATER WHITE

ODOR: SWEET; AVERAGE THRESHOLD AT 200 PPM

THG: 20 PPM TWA; 100 PPM EXCURSION

EYES: RAPID EVAPORATION OF THE LIQUID CAN CAUSE FROSTBITE TYPE INJURY TO THE CORNEA. VERY HIGH LEVELS (APPROXIMATELY 500 PPM) CAN CAUSE IRRITATION AND WATERING OF THE EYES.

SKIN: RAPID EVAPORATION OF LARGE AMOUNTS OF LIQUID CAN CAUSE FROSTBITE TYPE BURNS. PROLONGED OR CONFINED CONTACT CAN CAUSE PAIN, IRRITATION AND BLISTERING. DILUTE SOLUTIONS ON CONTACT WITH MOIST SKIN ARE MOST LIKELY TO CAUSE IRRITATION. REPEATED CONTACT COULD LEAD TO SENSITIZATION (ALLERGIC RESPONSES TO EVEN LOW VAPOR LEVELS).

INHALATION: ACUTE -- MAY CAUSE RESPIRATORY IRRITATION AND LUNG INJURY; CENTRAL NERVOUS SYSTEM DEPRESSION (DIZZINESS, CONFUSION, NAUSEA) MAY ALSO OCCUR, BUT AT HIGHER LEVELS (APPROXIMATELY 4000 PPM).

CHRONIC -- MAY CAUSE RESPIRATORY IRRITATION AND A RESULTING INCREASE IN RESPIRATORY PROBLEMS.

INGESTION: LARGE AMOUNTS COULD CAUSE GASTRIC IRRITATION AND SOME LIVER INJURY. NOT LIKELY TO BE INGESTED IN TOXIC AMOUNTS FROM ORDINARY HANDLING.

AUTHOR: G. H. FLORES

CHECKED BY: R. L. DANIEL, INDUSTRIAL HYGIENE
J. D. BUREK, TOXICOLOGY
M. F. CURRIER, MEDICAL

ISSUE DATE: REVISED JULY 18, 1980

AREA USED REASON

REACTOR AREA SOME EXPOSURE WHEN SAMPLES ARE TAKEN DIRECTLY FROM REACTOR

LAB WHEN GAS SAMPLES ARE ANALYZED

CONSEQUENCES OF EXPOSURE TO TOXIC AMOUNTS

COMPOUND: METHYL CHLORIDE

FORM: GAS AT ROOM TEMPERATURE

EYES: GAS IS NOT LIKELY TO CAUSE AN EFFECT. LIQUID MAY CAUSE A FROSTBITE TYPE BURN.

SKIN: GAS IS NOT IRRITATING; LIQUID MAY CAUSE A FROSTBITE TYPE BURN.

INHALATION: ACUTE OVEREXPOSURE MAY CAUSE A FEELING OF DRUNKENNESS, HEADACHE, DROWSINESS, BLURRED VISION, VOMITING, NAUSEA AND ABDOMINAL PAIN (400 PPM OR GREATER); THESE EFFECTS MAY CONTINUE FOR MANY HOURS AFTER EXPOSURE CEASES AND MAY CAUSE AN ACCIDENT WITH MUCH WORSE EFFECTS THAN THE METHYL CHLORIDE OVEREXPOSURE ITSELF. THERE MAY BE A DELAY BETWEEN THE OVEREXPOSURE AND THE INITIAL FEELING OF DRUNKENNESS. REPEATED OVEREXPOSURE TO LOWER CONCENTRATIONS (200 PPM TO 400 PPM) MAY PRODUCE THE SAME SYMPTOMS.

THERE IS NO WARNING THAT HIGH CONCENTRATIONS ARE PRESENT SINCE METHYL CHLORIDE HAS NO ODOR AND IS NOT IRRITATING.

IHC: 50 PPM TWA, 200 PPM EXCURSION

AUTHOR: S. L. DOMBROWSKI

CHECKED BY: M. G. SWANK, INDUSTRIAL HYGIENE
M. J. McKENNA, TOXICOLOGY
P. J. BROWNSON, MEDICAL

ISSUE DATE: REVISED: JULY 16, 1980

<u>AREA USED</u>	<u>REASON</u>
------------------	---------------

REACTOR AREA	SOME EXPOSURE WHEN SAMPLES ARE TAKEN DIRECTLY FROM REACTOR
--------------	--

LAB	WHEN GAS SAMPLES ARE ANALYZED
-----	-------------------------------

CONSEQUENCES OF EXPOSURE TO TOXIC AGENTS

COMPOUND: PROPYLENE OXIDE

SYNONYMS: 1,2-EPOXYPROPANE

FORM: AT ROOM TEMPERATURE: LIQUID; WATER WHITE

ODOR: SWEET; AVERAGE THRESHOLD AT 200 PPM

ING: 20 PPM TWA; 100 PPM EXCURSION

EYES: RAPID EVAPORATION OF THE LIQUID CAN CAUSE FROSTBITE TYPE INJURY TO THE CORNEA. VERY HIGH LEVELS (APPROXIMATELY 500 PPM) CAN CAUSE IRRITATION AND WATERING OF THE EYES.

SKIN: RAPID EVAPORATION OF LARGE AMOUNTS OF LIQUID CAN CAUSE FROSTBITE TYPE BURNS. PROLONGED OR CONFINED CONTACT CAN CAUSE PAIN, IRRITATION AND BLISTERING. DILUTE SOLUTIONS ON CONTACT WITH MOIST SKIN ARE MOST LIKELY TO CAUSE IRRITATION. REPEATED CONTACT COULD LEAD TO SENSITIZATION (ALLERGIC RESPONSES TO EVEN LOW VAPOR LEVELS).

INHALATION: ACUTE -- MAY CAUSE RESPIRATORY IRRITATION AND LUNG INJURY; CENTRAL NERVOUS SYSTEM DEPRESSION (DIZZINESS, CONFUSION, NAUSEA) MAY ALSO OCCUR, BUT AT HIGHER LEVELS (APPROXIMATELY 4000 PPM).

CHRONIC -- MAY CAUSE RESPIRATORY IRRITATION AND A RESULTING INCREASE IN RESPIRATORY PROBLEMS.

INGESTION: LARGE AMOUNTS COULD CAUSE GASTRIC IRRITATION AND SOME LIVER INJURY. NOT LIKELY TO BE INGESTED IN TOXIC AMOUNTS FROM ORDINARY HANDLING.

AUTHOR: G. H. FLORES

CHECKED BY: R. L. DANIEL, INDUSTRIAL HYGIENE
J. D. BUREK, TOXICOLOGY
M. F. CURRIER, MEDICAL

ISSUE DATE: REVISED JULY 18, 1980

AREA USED REASON

REACTOR AREA SOME EXPOSURE WHEN SAMPLES ARE TAKEN DIRECTLY FROM REACTOR

LAB WHEN GAS SAMPLES ARE ANALYZED

DO 096363
CONFIDENTIAL

CONSEQUENCES OF EXPOSURE TO TOXIC AMOUNTS

COMPOUND: PROPYLENE OXIDE

SYNONYMS: 1,2-EPOXYPROPANE

FORM: AT ROOM TEMPERATURE: LIQUID; WATER WHITE

ODOR: SWEET; AVERAGE THRESHOLD AT 200 PPM

INH: 20 PPM TWA; 100 PPM EXCURSION

EYES: RAPID EVAPORATION OF THE LIQUID CAN CAUSE FROSTBITE TYPE INJURY TO THE CORNEA. VERY HIGH LEVELS (APPROXIMATELY 500 PPM) CAN CAUSE IRRITATION AND WATERING OF THE EYES.

SKIN: RAPID EVAPORATION OF LARGE AMOUNTS OF LIQUID CAN CAUSE FROSTBITE TYPE BURNS. PROLONGED OR CONFINED CONTACT CAN CAUSE PAIN, IRRITATION AND BLISTERING. DILUTE SOLUTIONS ON CONTACT WITH MOIST SKIN ARE MOST LIKELY TO CAUSE IRRITATION. REPEATED CONTACT COULD LEAD TO SENSITIZATION (ALLERGIC RESPONSES TO EVEN LOW VAPOR LEVELS).

INHALATION: ACUTE -- MAY CAUSE RESPIRATORY IRRITATION AND LUNG INJURY; CENTRAL NERVOUS SYSTEM DEPRESSION (DIZZINESS, CONFUSION, NAUSEA) MAY ALSO OCCUR, BUT AT HIGHER LEVELS (APPROXIMATELY 4000 PPM).

CHRONIC -- MAY CAUSE RESPIRATORY IRRITATION AND A RESULTING INCREASE IN RESPIRATORY PROBLEMS.

INGESTION: LARGE AMOUNTS COULD CAUSE GASTRIC IRRITATION AND SOME LIVER INJURY. NOT LIKELY TO BE INGESTED IN TOXIC AMOUNTS FROM ORDINARY HANDLING.

AUTHOR: G. H. FLORES

CHECKED BY: R. L. DANIEL, INDUSTRIAL HYGIENE
J. D. BUREK, TOXICOLOGY
M. F. CURRIER, MEDICAL

ISSUE DATE: REVISED JULY 18, 1980

AREA USED REASON

REACTOR AREA SOME EXPOSURE WHEN SAMPLES ARE TAKEN DIRECTLY FROM REACTOR

LAB WHEN GAS SAMPLES ARE ANALYZED

DO 096364
CONFIDENTIAL

CONSEQUENCES OF
OVEREXPOSURE

COMPOUND: POTASSIUM DICHROMATE

EYES: IRRITATION

SKIN: IRRITATION AND SORES UNLESS WASHED FROM
SKIN AND CLOTHING.

INHALATION: IRRITATION OF THE NOSE AND THROAT. SORES
IN THE PARTITION OF THE NOSE MAY RESULT
FROM FREQUENT EXPOSURE.

AREA USED

REASON

LAB

USED IN CHLORIDE ANALYSIS

WASH CONTROL

CONSEQUENCES OF OVEREXPOSURE GUIDE

COMPOUND: 1-OCTANOL

SYNONYMS: OCTYL ALCOHOL; CAPRYL ALCOHOL.

NOTE -- THE TERM CAPRYL ALCOHOL HAS BEEN USED FOR BOTH 1-OCTANOL AND 2-OCTANOL. THE TERM OCTYL ALCOHOL HAS BEEN USED FOR BOTH 1-OCTANOL AND 1-ETHYLHEXANOL.

STATE: COLORLESS LIQUID WITH PENETRATING, CHARACTERISTIC AROMATIC ODOR.

IHG: NONE ESTABLISHED**

EYES: IRRITATION AND SHORT TERM CORNEAL INJURY.

SKIN: MILD IRRITATION BUT WITH PROLONGED EXPOSURE MAY BE ABSORBED THROUGH THE SKIN. NO SENSITIZATION SHOULD OCCUR.

INGESTION: LOW ORAL TOXICITY. NOT LIKELY TO BE INGESTED IN AMOUNTS SUFFICIENT TO CAUSE INJURY.

INHALATION: NO KNOWN HAZARD WITH NORMAL INDUSTRIAL HANDLING.

REFERENCES: INDUSTRIAL HYGIENE DATA SHEET, 1968; PUBLISHED TOXICOLOGY REPORTS, 1972.

AUTHOR: D. D. HICKS

CHECKED BY: R. L. DANIEL, INDUSTRIAL HYGIENE
R. V. JOHNSTON, TOXICOLOGY
R. E. FLAKE, MEDICAL

ISSUE DATE: 5/5/80

USED IN ARF-2 - REFRIGERATION UNIT

**RECOMMEND REGULATING AT 25 PPM UNTIL IHG ESTABLISHED.

RESTRICTED: for use within The Dow Chemical Company only.

CONSEQUENCES OF OVEREXPOSURE GUIDE

COMPOUND: XYLENE, MIXED ISOMERS

ODOR: DETECTABLE AT 200 PPM. ABILITY TO DETECT BY SMELL DIMINISHES RAPIDLY; ODOR IS NOT A GOOD WARNING PROPERTY.

IHG: TLV OF 100 PPM.

EYES: LIQUID IN THE EYES MAY CAUSE IRRITATION AND TEMPORARY EYE DAMAGE.

SKIN: PROLONGED OR REPEATED CONTACT WITH THE LIQUID MAY CAUSE DRYNESS AND DERMATITIS. SIGNIFICANT AMOUNTS MAY BE ABSORBED THROUGH THE INTACT SKIN DURING PROLONGED EXPOSURES.

INGESTION: UNLIKELY TO BE SWALLOWED IN TOXIC AMOUNTS.

INHALATION: ACUTE -- MAY CAUSE DROWSINESS, INCOORDINATION, IRRITATION OF THE RESPIRATORY SYSTEM AND NAUSEA.

CHRONIC -- SIMILAR TO ACUTE EFFECTS; MAY ALSO CAUSE SLIGHT DAMAGE TO THE BLOOD FORMING ORGANS.

REFERENCES: PATTY, VOLUME II, 1963; "CHEMICAL HAZARDS OF THE WORKPLACE," 1978; INDUSTRIAL HYGIENE DATA SHEET.

AUTHOR: R. A. DOMMER

CHECKED BY: R. L. DANIEL, INDUSTRIAL HYGIENE
R. V. JOHNSTON, TOXICOLOGY
A. L. MCDOWELL, MEDICAL

ISSUE DATE: REVISED 5/5/80

<u>AREA USED</u>	<u>REASON</u>
LAB	USED IN DEGREE OF SUBSTITUTION ANALYSIS

CONSEQUENCES OF OVEREXPOSURE

COMPOUND: SILVER NITRATE

INHALATION

OR

INGESTION: CAN CAUSE A GENERALIZED BLUE-GRAY DISCOLORATION OF THE SKIN, EYES AND MUCOUS MEMBRANES. THE SILVER COMPOUNDS ARE NOT EASILY REMOVED FROM THE BODY AND CAN ACCUMULATE TO THE POINT WHERE THE DISCOLORATION OCCURS.

METHODS OF CONTROL

DIHG - 0.01 MG/M^3 - TO PREVENT THE ACCUMULATION OF SILVER IN THE BODY TO AVOID THE COSMETIC DEFECT.

AREA USED

REASON

LAB

USED FOR CHLORIDE ANALYSIS

WASH CONTROL

DO 096368
CONFIDENTIAL

12/75

CONSEQUENCES OF OVEREXPOSURE GUIDE

COMPOUND: SODIUM ACETATE

EYES: MAY CAUSE MODERATE IRRITATION.

SKIN: REPEATED OR PROLONGED CONTACT MAY CAUSE MILD IRRITATION.

INGESTION: LOW ACUTE ORAL TOXICITY; AMOUNTS INGESTED INCIDENTAL TO INDUSTRIAL HANDLING ARE NOT LIKELY TO CAUSE INJURY.

INHALATION: MAY CAUSE IRRITATION OF THE NOSE AND THROAT.

IHG: 10 MG/M³

REFERENCE: INDUSTRIAL HYGIENE DATA SHEET; MERCK INDEX.

AUTHOR: K. B. O'MALLEY

CHECKED BY: INDUSTRIAL HYGIENE - M. G. SWANK
TOXICOLOGY - J. B. BETSO
MEDICAL - P. J. BROWNSON

DATE: REVISED 2/4/80

AREA USED

REASON

LAB

USED IN CHEMICAL IRON ANALYSIS

CONSEQUENCES OF OVEREXPOSURE GUIDE

MATERIAL: TOLUENE

EYES: LIQUID CONTACT WILL CAUSE IRRITATION

SKIN: LIQUID MAY CAUSE IRRITATION IF NOT WASHED OFF. CAN BE ABSORBED THROUGH SKIN, BUT NOT IN HARMFUL AMOUNTS IF WASHED OFF OCCASIONALLY.

INHALATION: HIGH VAPOR CONCENTRATIONS MAY CAUSE DIZZINESS, FATIGUE AND MENTAL CONFUSION. SOME OF THESE SYMPTOMS MAY CONTINUE SEVERAL HOURS AFTER THE EXPOSURE. NAUSEA, INCOORDINATION THE FOLLOWING DAY; JAUNDICE. CHRONIC EXPOSURE - ABNORMAL BLEEDING.

INGESTION: COULD CAUSE TIRED BLOOD; 6-8 OUNCES FOR 100 POUND PERSON COULD BE FATAL.

IHG: 100 PPM

ODOR THRESHOLD: 1-5 PPM

REFERENCE: PATTY, 1974 DATA SHEET, 1950 MEDICAL CARD

AUTHOR/DATE: R. A. Olson/02-28-78

REVIEWING PHYSICIAN: J. L. Gamble/06/05/78

<u>AREA USED</u>	<u>REASON</u>
LAB	USED IN DEGREE OF SUBSTITUTION ANALYSIS

RESTRICTED: for use within The Dow Chemical Company only.

FORM C-4750

DO 096370
CONFIDENTIAL

CONSEQUENCES OF OVEREXPOSURE GUIDE

COMPOUND: ETHYLENE DICHLORIDE

SYNONYMS: 1,2-DICHLOROETHANE; EDC.

EYES: CONTACT CAUSES PAIN AND WATERING OF THE EYES. IF NOT FLUSHED PROMPTLY IT CAN RESULT IN DAMAGE TO THE CORNEA AND POSSIBLE IMPAIRMENT OF VISION.

SKIN: CONFINED CONTACT CAN CAUSE BURNING IRRITATION AND TISSUE DAMAGE. PROLONGED OR REPEATED CONTACT CAUSES CHAPPING AS THE FATS ARE DISSOLVED. ABSORPTION THROUGH THE SKIN IN AMOUNTS LARGE ENOUGH TO CAUSE INJURY TO THE LIVER, KIDNEYS AND CENTRAL NERVOUS SYSTEM CAN OCCUR IN CASE OF A LARGE EXPOSURE.

INGESTION: QUITE TOXIC BY INGESTION; IT CAN CAUSE NAUSEA, INJURY TO THE LIVER AND KIDNEYS AND DEPRESSION OF THE CENTRAL NERVOUS SYSTEM.

INHALATION: IRRITATING TO THE RESPIRATORY TRACT. MAY CAUSE SALIVATION, SNEEZING AND COUGH. ACUTE OR CHRONIC EXPOSURES CAN CAUSE NAUSEA, VOMITING, DIZZINESS, MENTAL CONFUSION, INCOORDINATION, PULMONARY EDEMA AND SERIOUS DAMAGE TO THE LIVER, KIDNEYS AND ADRENALS.

COMMENTS: STUDIES BY THE NATIONAL CANCER INSTITUTE SUGGEST THAT EDC MAY BE AN ANIMAL CARCINOGEN.

IHG: TLV OF ¹⁰~~50~~ PPM (8 HOUR TWA) TO PREVENT LIVER DAMAGE AND MINIMIZE THE INCIDENCE OF NAUSEA.

ODOR: THRESHOLD AT 40 PPM (SWEET, CHLOROFORM-LIKE).

REFERENCES: PATTY, VOLUME II, 1963; VERSCHUUREN, 1977; NIOSH CIB #27, 1978; "CHEMICAL HAZARDS OF THE WORKPLACE," 1978.

AUTHOR: W. E. LEDFORD

CHECKED BY: C. E. HALPHEN, INDUSTRIAL HYGIENE
J. E. BETSO, TOXICOLOGY
M. F. CURRIER, MEDICAL

ISSUE DATE: REVISED 5/5/80

AREA USED REASON
LAB USED IN SPECIAL TEST OF F50 PREMIUM VISCOSITY

DO 096371
CONFIDENTIAL

RESTRICTED: for use within The Dow Chemical Company only.

Consequences of Exposure to Toxic Amounts

COMPOUND: CARBON TETRACHLORIDE

SYNONYMS: CARBON TET; TETRACHLOROMETHANE

EYES: SLIGHT TRANSITORY IRRITATION.

SKIN: DEFATS THE SKIN; SLIGHT ABSORPTION.

INHALATION: CENTRAL NERVOUS SYSTEM DEPRESSION; LIVER AND KIDNEY DAMAGE.

INGESTION: AMOUNTS INGESTED INCIDENTAL TO INDUSTRIAL HANDLING SHOULD NOT CAUSE INJURY.

IHG: ⁵~~10~~ PPM - AVOID SKIN CONTACT

ODOR THRESHOLD: 70 PPM; PLEASANT, SWEET AROMA

NOTE: CARBON TETRACHLORIDE WAS EVALUATED FOR FETAL (CONCEPTUS) TOXICITY. NO SPECIAL LIMITATIONS OR WARNINGS ARE REQUIRED. STANDARD EXPOSURE GUIDELINES AND TRAINING WILL APPLY TO ALL PERSONNEL.

REFERENCE: 1978 DATA SHEET; PATTY II, 1963.

AUTHOR: L. G. SILVERSTEIN

REVIEWED BY: L. W. RAMPY, INDUSTRIAL HYGIENE
K. S. RAO, TOXICOLOGY
R. C. KOLESAR, MEDICAL

ISSUE DATE: REVISED 9/27/78

AREA USED
LAB

REASON
USED IN TEST OF VISCOSITY FOR F4M PAINT REMOVER GRADE

RESTRICTED: for use within The Dow Chemical Company only.

DO 096372
CONFIDENTIAL

CONSEQUENCES OF OVEREXPOSURE GUIDE

COMPOUND: SULFURIC ACID

FORM AT ROOM TEMP: LIQUID

EYES: LIQUID CONTACT MAY RESULT IN PERMANENT LOSS OF VISION.

SKIN: EXPOSURE RAPIDLY CAUSES SEVERE CHEMICAL BURNS.

INHALATION: SULFURIC ACID HAS VERY LITTLE VAPOR AND, THEREFORE, INHALATION EXPOSURE IS USUALLY ENCOUNTERED IN THE FORM OF AN AEROSOL. SULFURIC ACID MIST MAY ERODE THE TEETH AND PRODUCE IRRITATION OF THE UPPER RESPIRATORY SYSTEM AND NASAL PASSAGES. EXPOSURES TO CONCENTRATIONS OF 3 MILLIGRAMS/CUBIC METER OF AIR CAUSES A CHOKING SENSATION IN PERSONS NOT ACCUSTOMED TO THE VAPOR. OVEREXPOSURE MAY ALSO PRODUCE LUNG INJURY.

CONTROL STANDARD: 1 MG/M³

NOTE: SULFURIC ACID WAS EVALUATED FOR FETAL (CONCEPTUS) TOXICITY. NO SPECIAL LIMITATIONS OR WARNINGS ARE REQUIRED. STANDARD EXPOSURE GUIDELINES AND TRAINING WILL APPLY TO ALL PERSONNEL.

SOURCE: PATTY; 1978 DATA SHEET AND MEDICAL CARD

REVISED: L. G. SILVERSTEIN/9-27-78

AREA USED

LAB

REASON

DILUTE SOLUTIONS ARE USED IN TESTS FOR DETERMINING % NAOH AND % ACID OF TREATING CHEMICALS

RESTRICTED: for use within The Dow Chemical Company only.

FORM C-47899

DO 096373
CONFIDENTIAL

5. Flammability²¹

Methyl bromide is practically nonflammable. Flame propagation is in the narrow range of 1 per cent (13.5 to 14.5 per cent by volume in air). The ignition temperature is 537°C.

6. Odor and Warning Properties

Methyl bromide, itself, has practically no odor or irritating effect and, therefore, no warning, even at physiologically hazardous concentrations. Some mixtures of methyl bromide used in the fumigation field contain chloropicrin or similar irritant material which aids in giving warning of significant concentrations of methyl bromide.

METHYL IODIDE, CH₃I (Moniodomethane)

1. Uses and Industrial Exposures

Methyl iodide is used principally as a chemical intermediate. It has been proposed as a fire extinguisher²² and insecticidal fumigant.

2. Physical and Chemical Properties

Physical state: colorless liquid
Molecular weight: 141.95
Specific gravity: 2.279 (20°/4°C.)
Melting point: -66.1°C.
Boiling point: 42.50°C.
Vapor density: 4.9 (air = 1)
Vapor pressure: 400 mm. Hg (25°C.)
Refractive index: 1.5293 (21.0°C.)
Per cent in "saturated" air: 53 (25°C.)
Density of "saturated" air: 3.04 (air = 1)
Solubility: 1 vol. per 125 vol. water at 15°C.; soluble in ethanol and ethyl ether
1 mg./liter $\approx$ 172 p.p.m. and 1 p.p.m. $\approx$ 5.8 mg./cu. meter at 25°C., 760 mm. Hg

3. Physiological Response

As methyl iodide has not been widely or extensively used, the toxicological investigations and experience have been limited. It appears to be primarily a central nervous system depressant. There are also indications of lung irritation from acute exposures.

²¹ Chemical Safety Data Sheet SD-35. Manufacturing Chemists Assoc., Washington, D. C., 1949.

²² Paint Technol., 13, 90 (1948).

AREA USED

REASON

LAB

VERY SMALL QUANTITIES (90 MICROLITERS)
USED IN PREPARING CALIBRATION STANDARD FOR DEGREE OF
SUBSTITUTION ANALYSIS.

Medical Control: Preplacement and annual periodic physical examination with emphasis on the nervous system, liver, kidneys, and skin.

References

Principal

1. Council on Pharmacy and Chemistry: Pharmacologic properties of toxaphene, a chlorinated hydrocarbon insecticide. *JAMA*, 149:1135, 1952.
2. McGee, L. C., Reed, H. L., and Fleming, J. P.: Accidental poisoning by toxaphene. *JAMA*, 149:1124, 1952.
3. Hayes, W. J., Jr.: Clinical Handbook on Economic Poisons. Emergency Information for Treating Poisoning, U.S. Public Health Service Publication No. 476. pp. 47-50, 71-73. Washington, D.C.: U.S. Government Printing Office, 1963.

Supplemental

4. Warraki, S.: Respiratory hazards of chlorinated camphene. *Arch. Environ. Health*, 7:137, 1963.
- von Oettingen, W. F.: The Halogenated Aliphatic, Olefinic, Cyclic, Aromatic, and Aliphatic-Aromatic Hydrocarbons, Including the Halogenated Insecticides, Their Toxicity and Potential Dangers. Public Health Service Publication No. 414. pp. 329-333. Washington, D.C.: U.S. Government Printing Office, 1955.
6. A.C.G.I.H.: Chlorinated camphene (toxaphene). Documentation of the TLVs for Substances in Workroom Air. ed. 3, p. 45. Cincinnati, 1976.
7. Adams, R. D.: The convulsive state and idiopathic epilepsy. In Thorn, G. W. et al. (eds.): *Harrison's Principles of Internal Medicine*. ed. 8, pp. 127-135. New York: McGraw-Hill, 1977.

Uses: Anti-foaming agent; plasticizer; complexing agent in the extraction of heavy metals from ores

Exposure: Inhalation

Toxicology: Tributyl phosphate is an irritant of the eyes, mucous membranes, and skin; it causes pulmonary edema in animals, and severe exposure is expected to cause the same effect in humans.

Workers exposed to unspecified concentrations of vapor complained of headache and nausea; hot vapor was severely irritating to the eyes and throat.^{1,2} The liquid on the skin is said to be irritating.³

In rats, 123 ppm for six hours caused respiratory irritation.³ The oral LD₅₀ for rats was 3 g./kg; effects were weakness, dyspnea, pulmonary edema, and muscle twitching.³ The liquid dropped on the eye of a rabbit caused temporary epithelial injury and discomfort.³ *In vitro*, tributyl phosphate caused weak inhibition of cholinesterase in human erythrocytes and plasma.⁴

The TLV was set at a level to prevent nausea and headache.¹

Diagnosis: Signs and symptoms include headache; nausea; irritation of eyes and throat; dermatitis. By analogy with effects caused in animals, it may cause pulmonary edema.

Differential Diagnosis: Differentiate from other causes of conjunctivitis and mucous membrane irritation, such as viral infection of the upper respiratory tract and allergies.

If the tracheobronchial tree becomes involved, the symptoms and signs must be differentiated from cardiogenic pulmonary edema and from viral or bacterial pneumonia.

Special Tests: If severe exposure is suspected, diagnostic studies should include electrocardiogram, sputum gram stain and culture, and differential white blood cell count. If pulmonary edema occurs, there should be analysis of arterial blood gas.

Treatment: Institute appropriate procedures, such as removal from exposure, immediate flushing of eyes with water, and washing of skin with soap and water. If dermatitis occurs, see section in Chapter 5 on Treatment of Contact Dermatitis. If exposure is severe, hospitalization and observation for 72 hours for delayed onset of severe pulmonary edema is advisable. Refer to Therapeutic

TRIBUTYL PHOSPHATE

(C₄H₉)₃PO₄ 1977 TLV 5 mg/m³

Synonyms: TBP

Physical Form: Colorless liquid

AREA USED

LAB

REASON

SMALL QUANTITIES (A FEW DROPS) USED TO STOP FOAMING OF SOLUTIONS USED IN VISCOSITY ANALYSIS

DO 096375
CONFIDENTIAL

CONSEQUENCES OF
OVEREXPOSURE

COMPOUND: HYDROXYLAMINE

EYES: SEVERE IRRITATION, POSSIBLE PERMANENT
DAMAGE.

SKIN: SEVERE IRRITATION. EVENTUAL SENSITIZA-
TION IS POSSIBLE AFTER REPEATED EXPOSURES.

INHALATION: SEVERE IRRITATION TO NOSE, THROAT AND
LUNGS.

AREA USED

LAB

REASON

USED AS HYDROXYLAMINE HYDROCHLORIDE FOR
CHEMICAL IRON ANALYSIS

CONFIDENTIALS TO OVERSEAS GUIDE

COMPOUND: AMMONIA (GAS)

EXPOSURE LIMIT: 25 PPM (DOW)

ODOR: 47 PPM, SHARP AND IDENTIFIABLE, *5 ppm Detectable*

EYES: CONTACT WITH THE VAPOR CAN CAUSE SEVERE IRRITATION AND DAMAGE TO THE EYE IF THE CONCENTRATION IS HIGH.

SKIN: CONTACT WITH HIGH CONCENTRATIONS CAN CAUSE SEVERE IRRITATION AND BURNS.

INHALATION:

SHORT TERM: IRRITATING TO THE EYES, NOSE, THROAT AND LUNGS.

LONG TERM: UNKNOWN

COMMENTS: BECAUSE OF IRRITATING QUALITIES, PEOPLE ARE UNLIKELY TO REMAIN IN AREAS WHERE GAS CONCENTRATIONS ARE HIGH.

AREA USED

REASON

LAB

SMALL QUANTITIES (A FEW DROPS) ARE USED IN TREATED PRODUCT SOLUTIONS WHEN RUNNING VISCOSITY (AMMONIUM HYDROXIDE)

By: R. L. COLWELL
REVISED: 9-4-78

R. L. Colwell NO
REVIEWING PHYSICIAN
DATE: 10-9-78

COMPOUND: AMMONIA (GAS)

EXPOSURE LIMIT: 25 PPM (DOW)

ODOR: 47 PPM, SHARP AND IDENTIFIABLE, 5 ppm Detectable

EYES: CONTACT WITH THE VAPOR CAN CAUSE SEVERE IRRITATION AND DAMAGE TO THE EYE IF THE CONCENTRATION IS HIGH.

SKIN: CONTACT WITH HIGH CONCENTRATIONS CAN CAUSE SEVERE IRRITATION AND BURNS.

INHALATION:

SHORT TERM: IRRITATING TO THE EYES, NOSE, THROAT AND LUNGS.

LONG TERM: UNKNOWN

COMMENTS: BECAUSE OF IRRITATING QUALITIES, PEOPLE ARE UNLIKELY TO REMAIN IN AREAS WHERE GAS CONCENTRATIONS ARE HIGH.

AREA USED

REASON

LAB

SMALL QUANTITIES (A FEW DROPS) ARE USED IN TREATED PRODUCT SOLUTIONS WHEN RUNNING VISCOSITY (AMMONIUM HYDROXIDE)

BY: R. L. COLWELL
REVISED: 9-4-78

R. L. Colwell NO
REVIEWING PHYSICIAN
DATE: 10-9-78

CONSEQUENCES OF OVEREXPOSURE

MATERIAL: Sodium hydroxide (caustic)

SKIN: Deep and painful destruction of tissue causing a severe burn. Dilute solutions can dissolve skin fats causing blister formation.

EYES: Contact with even dilute solutions will cause destruction of tissue which may result in loss of vision.

INHALATION: Coughing, sneezing, painful nose and throat irritation, possible destruction of the nasal tissue.

IHG: 2 mg/m³ (TWA and ceiling)

REFERENCES: Dow Industrial Hygiene and Toxicology data sheet, Patty 11, Documentation of TLV

AUTHOR/DATE: R. W. Bohl, 12/15/77
PHYSICIAN/DATE: R. C. Kolesar

CONSEQUENCES OF
OVEREXPOSURE

COMPOUND: METHYL CELLULOSE (METHOCEL[®])

EYES: NO EFFECT TO POSSIBLE MINOR IRRITATION,
INJURY AND PAIN.

SKIN: NO EFFECT

INHAL: NUISANCE PARTICULATE

IHG: 10 MG/M³, SUGGESTED

DO 096380
CONFIDENTIAL

CONSEQUENCES OF OVEREXPOSURE

COMPOUND: ALKALI CELLULOSE

EYES: HIGH INJURY POTENTIAL. MAY CAUSE SEVERE
IMPAIRMENT OF VISION.

SKIN: CAN CAUSE SEVERE BURNS PARTICULARLY IF IN
CONTACT WITH MOIST OR ABRADED SKIN.

INHALATION: PAINFUL TO NOSE AND THROAT.

CONSEQUENCES OF
OVEREXPOSURE

COMPOUND: AMMONIUM HYDROXIDE (AQUEOUS AMMONIA)

EYES: POSSIBLE PERMANENT LOSS OF VISION.

SKIN: EXPOSURE RAPIDLY CAUSES SEVERE CHEMICAL
BURNS.

INHAL: IRRITATION OF THE EYES, UPPER RESPIRATORY
SYSTEM AND NASAL PASSAGES. AT HIGH AMMONIA
CONCENTRATION, THE IRRITATION BECOMES INTOL-
ERABLE.

IHG: 25 PPM AMMONIA

AREA USED

REASON

LAB

SMALL QUANTITIES (A FEW DROPS) ARE USED IN TREATED
PRODUCT SOLUTIONS WHEN RUNNING VISCOSITY.

DO 096381
CONFIDENTIAL

GES
5/76

The Dow Chemical Company

Louisiana Division

Industrial Hygiene

Date 12-19-83Location Cellulosewee duffordSURVEY REPORTCalibrated (YES)

NO

SAMPLE NO.	SAMPLE DATE	CONCENTRATION	UNITS	CHEMICAL SAMPLED	DURATION	SAMP. TYPE	REMARKS (CLASSIFICATION, DESCRIPTION, EMP. NAME, WEATHER, ETC.)
3691	11-21-83	1 %	max. allowable	Noise	7 hr.	Pers. TWA	W. Russell, OS, Computer control room
3698	11-21	39 %	max. allowable	Noise	6 hr.	Pers. TWA	F. Manzo, OT, Wash area
3955	11-17	7 %	max. allowable	Noise	8 hr.	Pers. TWA	M. Randall, S.O.T, Packaging area in warehouse
3956	11-17	155 %	max. allowable	Noise	7 hr.	Pers. TWA	B. Wesley, S.O.T, Alkali line
5209	12-5	0.52	mg/m ³	methocel dust	7 hr.	Pers. TWA	A. Williams Jr., SOT, Packaging area
5210	12-5	2.2	mg/m ³	methocel dust	7 hr.	Pers. TWA	D. Simon, laborer, Packaging area
5211	12-6	0.75	mg/m ³	methocel dust	7 hr.	Pers. TWA	C. Wilson, laborer, Packaging area
5212	12-7	0.90	mg/m ³	methocel dust	7 hr.	Pers. TWA	C. Wilson, laborer, Packaging area
5213	12-7	0.67	mg/m ³	methocel dust	7 hr.	Pers. TWA	M. Randall, SOT, Packaging area

DO 096387
CONFIDENTIAL

The Dow Chemical Company

Louisiana Division

Industrial Hygiene

Date 12-21-83Location CelluloseW E LaidfordSURVEY REPORTCalibrated YES

NO

SAMPLE NO.	SAMPLE DATE	CONCENTRATION	UNITS	CHEMICAL SAMPLED	DURATION	SAMP. TYPE	REMARKS (CLASSIFICATION, DESCRIPTION, EMP. NAME, WEATHER, ETC.)
3690	11-21-83	0.2	PPM	MeCl	7 hr.	Pers. TWA	J. Crawley, SOT, working in lab.
		1.0	"	PO			
		0.6	"	DME			
3692	11-21	0.4	PPM	MeCl	7 hr.	Pers. TWA	R. Henson, SOT, Wash area
		15.	"	PO			
		2.4	"	DME			
3695	11-21	0.2	PPM	MeCl	7 1/2 hr.	Pers. TWA	D. Fernandez, OT, Reactor and Wash areas
		0.2	"	PO			
		0.3	"	DME			
3839	11-17	0.1	PPM	MeCl	7 1/2 hr.	Pers. TWA	B. Waguespack, SOT, Wash section
		0.1	"	PO			
		0.5	"	DME			

DO 096383
CONFIDENTIAL

SURVEY REPORT

W E Ledford

NO

[illegible]