

**PLANT
CHEMICAL
SAFETY
MANUAL
MONSANTO
TEXAS CITY , TEXAS**

STG 2430072

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LAM014338

INTRODUCTION

THIS MANUAL IS WRITTEN FOR
FOREMEN AND SUPERVISION.
THE MANUAL IS INTENDED TO
BE A SAFETY GUIDE. THIS
MANUAL LISTS CHEMICALS
USED.

SAFETY IS AN INDIVIDUAL
RESPONSIBILITY AT MONSANTO.

DEVELOPED BY CAPITAL PROJECTS
FOR CONTRACTORS.

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TOXICITY CHART

Chemical Name	Hypolemic Hazards			Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection	
Aluminum Chloride (AlCl ₃)	Avoid	Burns	Burns	Not Likely	X		Water Wash
Methylene (b)	Avoid, Toxic	Avoid	Irritating	Keep away from food	X		Fresh air, Remove Contaminated Cloth- ing, soap and water washing.
Chlorine (Cl ₂)	Avoid, Toxic	Liquid can burn	Avoid	Corrosive	X	X	Fresh air
Ethylbenzene (EM)	Avoid	Avoid	Irritating	Not Likely	X		Flush with water
Ethyl Chloride (EtCl)	Avoid	Possible Frost- bite	No known problem	No known problem			Fresh air
Ethylene (C ₂ H ₄)	Avoid	Avoid	Avoid	Keep away from food	X	X	Flush with water
Hydrogen Chloride (Gas or Liquid) (HCl-Muriatic Acid)	Avoid	Burns	Severe Irritation	Burns	X	X	Flush with water
Caustic (Sodium Hydroxide) NaOH Caustic	Avoid Mist	Burns	burns	Avoid Severe injury	X	X	Lots of water wash
Aluminum Chloride (771) AlCl ₃			This material is	relatively non-toxic			

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TOXICITY CHART							DEPT. NO. 14	
Chemical Name	Inhalation	Systemic Hazards		Swallowing Ingestion	Protection Required if Danger of Contact Exists			First Aid
					Goggles	Gloves	Breathing Protection	
Aluminum Chloride (Anhydrous) $AlCl_3$	Avoid	Skin Burns	Eye Burns	Not Likely	X	X		Water wash
Aluminum Chloride (27%) $AlCl_3$				Material is Relatively Non-Toxic				
Benzene (BZ)	Avoid, Toxic	Avoid	Irritating	Keep away from food	X			Fresh air, remove contaminated clothing, soap and water wash. Lots of water wash
Sodium Hydroxide (20-50%) (NaOH Caustic)	Avoid Mist	Burns	Burns	Avoid - Severe Injury	X	X		Fresh air
Chlorine (Cl_2)	Avoid, Toxic	Liquid can burn	Avoid	Corrosive	X	X	X	Flush with water
Ethylbenzene (EB)	Avoid	Avoid	Irritating	Not likely	X			Fresh air
Ethyl Chloride ($EtCl$)	Avoid	Possible Frostbite	No known problem	No known problem				Flush with water
Ethylene (CH_2)	Avoid	Avoid	Avoid	Keep away from food	X	X		Flush with water
Styrene (inhibitor (RS))	Avoid dust and vapor	Absorbed through skin	Irritant	Keep away from food	X	X (Discard gloves)	X	Wash with soap and water

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TOXICITY CHART					DEPT. NO 15	
Chemical Name	Hygienic Hazards			Protection Required if Danger of Contact Exists		First Aid
	Inhalation	Skin	Eye	Goggles	Breathing Protection	
Dehydrogenation Catalyst (Shell 105)	Avoid dust	Mild irritant	No known problem	X	X	Soap and water wash
Ethylbenzene (EB)	Avoid	Avoid	Irritant	X		Flush with water

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DEP, MD, 16

TOXICITY CHART

Chemical Name	Inhalation	Systemic Hazards			Protection Required if Danger of Contact Exists				First Aid
		Skin	Eye	(Swallowing)	Gloves	Goggles	Breathing Protection		
P-Tert-Butylcatechol (TBC)	Avoid when hot	Absorbed slowly	Acid dust	Keep away from food	X			Wash with soap and water	
Chlorine (Cl ₂)	Avoid, Toxic	Liquid, can burn	Avoid	Corrosive	X		X	Fresh Air	
Styrene Initiator (d51)	Avoid dust and vapor	Absorbed through skin	Irritant	Keep away from food	X	X	X	Wash with soap and water	
Ethylbenzene (EB)	Avoid	Avoid	Irritant	Not likely	X			Flush with water	
Styrene (SM)	Irritation	Burns	Burns	Avoid	X			Water wash, Fresh Air, first aid	
Sulfuric Acid (H ₂ SO ₄)	Irritation	Severe Burns	Severe Burns	Severe Injury	X	X		Water wash, first aid	
Toluene	Narcotic effect	Avoid	Irritation	Avoid	X			Fresh Air, water wash	

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TOXICITY CHART

Chemical Name	Hygienic Hazards			Protection Required If Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Gloves	Breathing Protection	
Sodium Hydroxide (20-50%) (NaOH-Caustic)	Avoid mist	Burns	Burns	Avoid - Severe injury	X	X	Rins of water wash
Chlorine (Cl ₂)	Avoid, Toxic	Liquid, can burn	Avoid	Corrosive	X	X	fresh air
Hydrogen Cyanide (HCN)	Do not breathe	Will absorb skin	Severe irritation	Very toxic	X	X	Flush with water
Acetonitrile (ACN)	Do not breathe	Avoid	Avoid	Not likely	X	X	Flush with water

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DEPT. NO. 25

TOXICITY CHART

Chemical Name	Hygienic Hazards			Protection Required If Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection	
Tert-butylamine (TBA)	Very toxic, dissipates fast	Burns	Serious Irri- tant	Severe injury - keep away from food	X	X	Use lots of water flushing under safety shower
N-tert-butylfor- amide (TBAF)	Non-toxic	Non toxic	Mild Irritant	Non-toxic			Flush with water
Sodium Hydroxide (20-50%) (NaOH- Caustic)	Avoid mist	Burns	Burns	Avoid - Severe injury	X		Lots of water wash
Hydrogen Cyanide (HCN)	Do not breathe	Will absorb skin	Severe irritation	Very toxic	X	X	Flush with water
Isobutylene (IBT)	Avoid	No known problem	No known problem	No known problem			Fresh air
Sulfuric Acid (H ₂ SO ₄)	Irritation	Severe burns	Severe burns	Severe injury	X		Water wash - first aid

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DEPT. NO. 27

TOXICITY CHART

Chemical Name	Hygienic Hazards			Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection	
Acetaldehyde (ACH)	Very irritating	Avoid (Evaporates rapidly)	Irritant	Not likely	X	X	Fresh air, water wash
Sodium Hydroxide (20-50%) (NaOH-Caustic)	Avoid mist	Burns	Burns	Avoid - Severe injury	X	X	Lots of water wash
Hydrogen Cyanide (ACH)	Do not breathe	Will absorb skin	Severe irritation	Very toxic	X	X	Flush with water
Electronitrite (CN)	Toxic	Will ab-orb	Severe irritation	Toxic	X	X	Flush with water
Phosphoric Acid, Hypophosphorus acid, phosphoric phosphor pentoxide (H ₃ PO ₄)	Slight irritant	Burns	Severe irritation	Toxic	X	X	Flush with water

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GHS, NO. 29

TOXICITY CHART

Chemical Name	Hygienic Hazards			Protection Required If Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	Goggles	Breathing Protection	Gloves	
Acetone (DMK)	Not very toxic Mostly a fire hazard	Dries the skin	Irritating	X	X	X	Flush with water
Acetone Cyanohydrin (ACT)	Very toxic	Must be avoided	Must be avoided	X	X	X	Fresh air, water flushing
Sodium Hydroxide (NaOH-Caustic)	Avoid mist	Burns	Burns	X	X	X	Lots of water wash
Hydrogen Cyanide (HCN)	Do not breathe	Will absorb skin	Severe irritation	X	X	X	Flush with water
Sulfuric Acid (H ₂ SO ₄)	Irritation	Severe burns	Severe burns	X	X	X	Water wash - first aid

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TOXICITY CHART

Chemical Name	Hazardous Effects				Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Gloves	Breathing Protection	
Lactic Acid (LA)	No known problem	Avoid	Irritating	No known problem	X			Fresh air/flush with water
Electronitrile (EN)	Toxic	Will absorb	Severe irritation	Toxic	X	X		Flush with water
Methyl Lactate (ML)	Avoid	Avoid	Mild irritant	Avoid	X			Flush with water

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DEPT. NO. 352

TOXICITY CHART

Chemical Name	Hazardous Effects			Protection Required if Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection	
Hexane (HEX)	Avoid	Irritating	Irritating	Unknown			Fresh air
Lime (Caustic)	Not likely	Very Irritating	Very Irritating	Toxic	X		Flush with water
Calcium Hydroxide							
Methanol (MEOH)	Avoid	Will absorb	Irritating	Toxic	X		Fresh air/flush with water

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TOXICITY CHART

Chemical Name	Hygienic Hazards				Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing)	Goggles	Breathing Protection		
Ammonia (NH ₃)	Strong irritant	Liquid NH ₃ burns	Avoid	Liquid corrosive	X	X		Fresh Air, wash with water
Butene (C ₄ H ₆)	Not toxic - fire hazard	Non-toxic non-corrosive	Avoid	Not likely				Flush with water
Diisobutylaluminum Hydride (DIBAH)	Avoid fumes (May catch fire)	Burns quickly	Avoid	Corrosive	X	X		Wash with water
Hexane (HEX)	Avoid	Irritating	Irritating	Unknown				Fresh air
Hydrogen (H ₂)	Not toxic - fire hazard		No known problem	No known problem				Fresh air
Methanol (MEOH)	Avoid	Will absorb	Irritating	Toxic	X			Fresh air/flush with water
Titanium tetrachloride (TiCl ₄)	Irritation	Corrosive	Corrosive	Avoid	X	X		Water wash - first aid

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TOXICITY CHART

DEPT. NO. 44

Chemical Name	Hygienic Hazards				Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection	Gloves	
Carbon Monoxide (CO)	Avoid, toxic	No known problem	No known problem	No known problem		X		Fresh air
Chlorine (Cl ₂)	Avoid, toxic	Liquid can burn	Avoid	Corrosive	X	X		Fresh air
Hydrogen (H ₂)	Not toxic - fire hazard	No known problem	No known problem	No known problem				Fresh air
Methane (CH ₄)	Not toxic - fire hazard	No known problem	No known problem	No known problem				Fresh air
Sulfuric Acid (H ₂ SO ₄)	Irritation	Severe burns	Severe burns	Severe injury	X		X	Water wash/first aid
Methanol (MEOH)	Avoid	Will absorb	Irritating	Toxic	X		X	Fresh air, flush with water
Caustic (Sodium Hydroxide) (NaOH)	Avoid mist	Burns	Burns	Avoid-Severe injury	X		X	Lots of water wash

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TOXICITY CHART

Chemical Name	Hygienic Hazards				Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection		
Carbon Monoxide (CO)	Avoid, toxic	No known problem	No known problem	No known problem				Fresh air
Methanol (MEOH)	Avoid	Will absorb	Irritating	Toxic	X			Fresh air/flush with water

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DEPT. NO. 46

TOXICITY CHART

Chemical Name	Hygienic Hazards				Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection		
Carbon Monoxide (CO)	Avoid, Toxic	No known problem	No known problem	No known problem				fresh air
Methanol (MEOH)	Avoid	Will absorb	Irritating	Toxic				fresh air/flush with water

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TOXICITY CHART

Chemical Name	Hygienic Hazards				Protection Required If danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection		
Oxo Intermediate (Aldehydes mix)	Toxic, Cobalt Hydrocarbonyl	Contaminated Clothing may catch fire	Avoid	Not likely	X			Fresh air, soap and water wash exposed areas
Carbon Monoxide (CO)	Avoid, toxic	No known problem	No known problem	No known problem		X		Fresh air
Cobalt Hydrocarbonyl HCO (Co4)	Avoid, toxic (has bad odor)	Avoid solvent	Avoid	Avoid		X		Fresh air
Cobaltic Oxide (CO2O3)	No known problem	Avoid solvent	No known problem	No known problem				Use soap and water
Hydrogen (H2)	Not toxic - fire hazard		No known problem	No known problem				Fresh air
Olefin Mix (Light Olefins)			-----This material is relatively non-toxic					Water wash
Olefin Alcohols (OAO)			-----This material is relatively non-toxic					Water wash
Sulfuric Acid (H2SO4)	Irritation	Severe burns	Severe burns	Severe injury	X	X		Water wash -first aid

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DEPT. NO. 50

TOXICITY CHART

Chemical Name	Hygienic Hazards				Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection	Protection	
Acetic Acid (AcOH)	Very Irritating	Burns	Severe damage	Avoid	X	X	X	lots of water washing
Carbon Monoxide (CO)	Avoid, toxic	No known problem	No known problem	No known problem				fresh air
Hydroiodic Acid (HI)	Avoid	Burns	Severe irritation	Burns	X	X	X	flush with water
Methyl Iodide (MI)	Avoid	Severe burns	Irritating	Toxic/burns	X	X	X	fresh air/flush with water
Rhodium Iodide (RI)	Avoid	Avoid	Avoid	Extremely toxic-keep away from food	X	X	X	flush with water

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TOXICITY CHART							DEPT. NO. 51	
Chemical Name	Hazardous Materials			Protection Required if Danger of Contact Exists			First Aid	
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection		
Acetaldehyde (ACH)	Very Irritating	Avoid (Evaporates rapidly)	Irritant	Not likely	X	X	Fresh air, water wash	
Acetic Acid (ACOH)	Very Irritating	Burns	Severe damage	Avoid	X	X	Lots of water washing	
Acrylonitrile (AN)	Evaporates	Remove contaminated clothes (Discard)	Irritant	Toxic	X (Plastic)	X	Fresh air, water or soap and water	
Ammonia (NH ₃)	Strong Irritant	Liquid NH ₃ burns	Avoid	Liquid corrosive	X	X	Fresh air, wash with water	
Chlorine (Cl ₂)	Avoid, toxic	Liquid can burn	Avoid	Corrosive	X	X	Fresh air	
Hydrogen Cyanide (HCN)	Do not breathe	Will absorb skin	Severe irritation	Very toxic	X	X	Flush with water	
Hydroquinone (HQ)	Avoid (dust)	Irritating	Severe irritation	Toxic	X	X	Flush with water	
Iodine (I ₂)	Avoid	Irritating	Severe irritation	Toxic	X	X	Fresh air/flush with water	
Methyl Ether of Hydroquinone (MEHQ)	Avoid	Irritating	Irritating	Toxic	X	X	Flush with water	
Propylene (PR)	Avoid	No known problem	No known problem	No known problem			Remove to fresh air	
Sodium Sulfite (Na ₂ SO ₃)	Liberates H ₂ S (toxic)	Irritation	Irritation	Avoid			Fresh air and water wash	
Acetonitrile (ACN)	Do not breathe	Avoid	Avoid	Not likely	X	X	Flush with water	

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TOXICITY CHART

DEPT. NO. 53

Chemical Name	Hygienic Hazards			Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing)	Goggles	Breathing Protection	
Maleic Anhydride (MA)	Irritating	Burns	Strong Irritant	Not likely	X	X	Remove to fresh air, flush with water
Phthalic Anhydride (PA)	Irritation	Corrosive	Corrosive	Avoid	X	X	Water wash and first aid
Sodium Sulfite (Na_2SO_3)	Liberates H_2S (toxic)	Irritation	Irritation	Avoid			Fresh air and water wash
Sulfur Dioxide (SO_2)	Up not breathe	Irritation	Burns	Avoid	X	X	Water wash, fresh air and first aid
Sulfuric Acid (H_2SO_4)	Irritation	Severe burns	Severe burns	Severe injury	X	X	Water wash - first aid
Xylene (3y)	Avoid	Irritation	Avoid		X		Fresh air and water wash

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TOXICITY CHART

Chemical Name	Hygienic Hazards				Protection Required If Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection		
Di-2-ethyl Phthalate (DEP)	-----	-----	This material is relatively non-toxic	-----	-----	-----	-----	Wash with soap and water
Dibutyl Phthalate (DBP)	-----	-----	This material is relatively non-toxic	-----	-----	-----	-----	Water wash
Di-2-ethylhexyl Phthalate (DEHP)	-----	-----	This material is relatively non-toxic	-----	-----	-----	-----	Water wash, fresh air, first aid
Oxalic Acid (OA)	Irritation	Corrosive	Corrosive	Toxic	I	-----	-----	Water wash
Phthalate Ester (Santolizer) (S-11)	-----	-----	This material is relatively non-toxic	-----	-----	-----	-----	Water wash
Stannous Oxalate (SO)	Avoid	Avoid	Avoid	-----	-----	-----	-----	Wash with soap and water

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DEPL. NO. Power 2

TOXICITY CHART

Chemical Name	Hygienic Hazards				Protection Required If Danger of Contact Exists			
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Gloves	Goggles	Breathing Protection	First Aid
Chlorine (Cl ₂)	Avoid, toxic	Liquid can burn	Avoid	Corrosive	X		X	Fresh air
Hydrogen Chloride (gas or liquid) (HCl)	Avoid	Burns	Severe irritation	Burns	X	X		Flush with water
Lime (Caustic)	Not likely	Very irritating	Very irritating	Toxic	X	X		Flush with water
Methane (CH ₄)	Not toxic - fire hazard	No known problem	No known problem	No known problem				Fresh air
Sodium Sulfide (Na ₂ S)	Liberates H ₂ (toxic)	Irritation	Irritation	Avoid				Fresh air and water wash
Zinc Chromate (ZnCrO ₄)	Avoid	Corrosive	Corrosive	Avoid	X	X		Water wash and fresh air

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TOXICITY CHART

Chemical Name	Hygienic Hazards				Protection Required If Danger of Contact Exists			
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection		
Formaldehyde (HCHO)	Irritating - severe	Irritating	Irritating	Severe irritant	X	X		Remove to fresh air, flush with water
Hydrogen Cyanide (HCN)	Do not breathe	Will absorb skin	Severe irritation	Very toxic	X	X		Flush with water

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TOXICITY CHART					DEPT. NO. DOCK 1	
Chemical Name	Myogenic Hazards			Protection Required If Danger of Contact Exists		First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles Breathing Protection	
Naphthalene (NAPH)	Avoid	Avoid		Not likely		Wash with soap and water
Carbonic Acid (Phenol)	Absorbed	Corrosive	Corrosive	Very toxic	X	Immediate washing with soap and water do not rub skin with- out delay
Vinyl Acetate (VAM)	Avoid	Avoid	Irritation	Avoid	X	Fresh air and water wash

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TOXICITY CHART

Chemical Name	Hygienic Hazards			Protection Required if Danger of Contact Exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Gloves	Goggles	Breathing Protection
Naphthalene (NAP)	Avoid	Avoid	Not likely	Not likely	X		
Carbonic Acid (Pheno)	Absorbed	Corrosive	Corrosive	Very toxic	X	X	Immediate washing with soap and water and first aid without delay
Vinyl Acetate (VAM)	Avoid	Avoid	Irritation	Avoid	X		Fresh air and water wash

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TOXICITY CHART		DEPT. NO. 513			
Chemical Name	Hazardous Hazards	Protection Required if Danger of Contact Exists			First Aid
		Inhalation	Swallowing	Breathing	
Ammonia (NH ₃)	Strong Irritant	Liquid NH ₃ burns	Liquid corrosive	X	fresh air, wash with water
Sulfuric Acid (H ₂ SO ₄)	Irritation	Severe burns	Severe injury	X	Water wash - first aid

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TOXICITY CHART

DEPT. NO. Chemicals found everywhere in plant

Chemical Name	Bygonic Hazards				Protection Required if Danger of Contact exists			First Aid
	Inhalation	Skin	Eye	(Swallowing) Ingestion	Goggles	Breathing Protection		
Acetylene (C ₂ H ₂)	Not toxic - fire hazard	No known problem	No known problem	No known problem				Remove to fresh air
Freon (Trade Name)	Not toxic	Burns	Burns	No known problem				Remove to fresh air
Methylene Chloride (MC-9)	Avoid	Irritating	Irritating	Avoid				fresh air/flush with water
Degreaser (CH ₂ Cl ₂)								

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NOTES:

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COLOR CODING OF PIPING

MATERIAL	BAND	STRIPE	
CLARIFIED WATER	GREEN	YELLOW	
FILTERED WATER	GREEN	GREEN	
POTABLE WATER	GREEN	BLUE	
SALT WATER	GREEN	BLACK	
FIRE WATER	RED		
UTILITY STEAM	ALUMINUM	BLACK	
HIGH PRESSURE STEAM	ALUMINUM	ORANGE	
CONDENSATE	GRAY		
BREATHING AIR	BLUE	WHITE	
PLANT AIR	GREEN	WHITE	
INERT GAS	GREEN	RED	
NATURAL GAS	YELLOW	RED	
GENERAL PROCESS FLUIDS		YELLOW	
TOXIC OR DANGEROUS FLUIDS	ORANGE	BLACK	
ALL YELLOW PIPE			
SUPER- HAZARDOUS FLUIDS	ACET	ORANGE	
	HCN	BLACK	
	CHLORINE	(CHLORINE LEGEND)	
	OTHER	(LEGEND)	

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