HNS MARITIME SAFETY DATA SHEET **FILE NO.: 101** **DATE: 18/11/13**

ORGANIC ACIDS

CAS No: - UN No: 3265

C- Corrosive, Xi – Irritant, Flammable

R10, R35, 36/38

S1/2, 23, 26, 45

DISSOLVER

KEY POINTS

KEY POINTS

- Corrosive and irritant. Some may be flammable and / or explosive.
- Heat may produce toxic gases. Acid vapours / fumes may be heavier than air.
- Reacts with water, oxidisers, caustics and metals releasing hydrogen.
- Exposure by any route may be dangerous causing irritation and tissue burns.
- Examples include acetic acid, formic acid, picric acid. Contains COOH group.

HUMAN HEALTH EXPOSURE ROUTES See Section 3

- Acute exposure can occur via all routes
- Causes burns and irritation to exposed tissues
- Ingestion of large amounts may cause pain and diarrhoea.
- Possible delayed effects.

FIRE See Section 8

- Some acids may be flammable / explosive
- In the event of a fire involving acid, use alcohol resistant foam or fine water spray
- Protective suits with breathing apparatus required.

ENVIRONMENT See section 11

- Avoid release to the environment
- Non persistent

MARITIME TRANSPORT

- Carried as liquid or solutions in drums or tanks

REACTIVITY WITH SEA WATER

- Dissolves forming acidic solution.
- NEVER apply water to fuming acid

INCIDENT MANAGEMENT

- Alert Emergency Services.
- Non-essential personnel should move at least 50 m away from the incident (25m for solid).
- There may be a public safety hazard outside the immediate area of the incident (See Table 1). Consider evacuation/shelter and set up of emergency rest centres for evacuees.
- Initiate real-time ambient monitoring, for use with meteorological and marine forecasts.
- Ambulance staff, paramedics and emergency department staff treating chemically contaminated casualties should be equipped with approved, decontamination suits and breathing apparatus.
- Decontamination run-off should be prevented from entering drains and watercourses.
- Risk Communication strategy to advise members of the public on evacuation/sheltering
- Post incident follow-up. Medical referrals. Biomarkers of exposure likely limited to evidence of burns

Summary Page

HNS MARITIME SAFETY DATA SHEET **FILE NO.:** **DATE:**

NAME

CATEGORY

HUMAN HEALTH CONSIDERATIONS – See Section 3 to 6

ERG 2012 Guide 153 Table 1: Initial isolation and protective action distances

Chemical Name	Spill Size	Definition	Isolation Zone in all directions	DownWind Protection Zone	
				Day	Night
UN3265					
	General	Drum or several	50 m	50 m	50 m
	Large	Tank / Rail car	800 m	800 m	

Isolation Distance: All personnel to be directed in a cross wind direction this distance from the spill

Protective Action Zone: A square area down wind of the spill where protective action should be considered, starting with nearest receptors and working away from spill.

Such estimates should always be regarded with reservations and never be alternatives for monitoring.

Acute Health Hazards

Dose	Route	Signs and symptoms (as Acetic Acid)
>25 ppm	Inhalation	Extreme eye and nasal irritation..
>80%	Skin, Eyes	Severe burns. Irreperable damage to eyesight
100%	Ingestion	Oesophageal Perforation, intravascular coagulopathy.

Monitoring Strategy (Short & Long Term) & Equipment

Occupational	Real time tube or electrochemical detection in air. Acidity (pH) of water and environmental media.
Environmental	Atmospheric Fate and Transport e.g. ALOHA, CALPUF (USEPA)
Public Health	GP referrals, hospital admissions, follow-up studies, biomarkers of exposure (burns)

OPERATIONAL EMERGENCY RESPONSE – See Section 8 & 9

Fire fighting measures:	Fine water spray to control vapours. Alcohol resistant foam.
Decontamination of responders	Use local protocols in designated areas, with adequate ventilation. Wash water should collected and disposed of at an appropriate waste facility
Response & Clean up:	Block drains and protect water courses. Ventillate drains or voids. Aqueous solutions can be flushed to drains with copious amounts of water
Waste Management	Waste water and clothing should be disposed of to an appropriate waste facility

EMERGENCY CONTACTS

ORGANISATION	TELEPHONE
FIRE, AMBULANCE, POLICE, COASTGUARD	999
Public Health England: Chemical Hazards Hot-line	08448 920555
ENVIRONMENT AGENCY: 24/7 Pollution	0800 807060

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DISSOLVER

SECTION 1: IDENTIFICATION

NAME:	**Organic Acids**		**CHEMICAL FORMULA:**	**-**	
SYNONYMS:	**Corrosive Liquids Acidic organic**				
CAS No:	**-**	**UN No:**	**3265**	**EINECS :**	**-**
CLASSIFICATIONS	**C- Corrosive, Xi – Irritant, F - Flammable**				
RISK PHRASES	**R10, R35, 36 / 38**				
SAFETY PHRASES	**S1/2, 23, 26, 45**				
USES: Various industrial and agricultural uses					

SECTION 2: PHYSICAL CHEMICAL PROPERTIES

SEBC CLASSIFICATION	Dissolver	**BOILING POINT**	>100 ^{o}C
APPEARANCE	Viscous liquid	**VAPOUR PRESSURE**	<5 KPa
ODOUR	Acrid Pungent	**SPECIFIC GRAVITY**(air = 1):	>1
FLAMMABILITY	Some may be Flammable or explosive	**SOLUBILITY IN WATER**	**Soluble**
STABILITY & REACTIVITY	Reacts with water generating heat. Decomposes to generate toxic gases when heated to decomposition e.g. CO. Will react with oxidizers, caustics and metals.		

ORGANIC ACIDS DISSOLVER

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SECTION 3: HUMAN HEALTH HAZARDS

ROUTES OF ENTRY: .

POTENTIAL HEALTH EFFECTS:

INHALATION	Inhalation causes irritation to eyes and nose with sore throat, cough, chest tightness, headache, fever, wheeze, tachycardia and confusion. Chemical pneumonitis, tachypnoea, dyspnoea and stridor due to laryngeal oedema may follow. Pulmonary oedema with increasing breathlessness, wheeze, hypoxia and cyanosis may take up to 36h to develop. Optic neuropathy has been reported following acute inhalation.
EYES	Ocular exposure causes pain, blepharospasm, lacrimation, conjunctivitis, palpebral oedema and photophobia. Acidic solutions may cause corneal burns.
SKIN	Dermal exposure causes coagulation burns, which are often self-limiting and superficial with the destruction of the surface epithelium and submucosa.
INGESTION	Ingestion of small amounts is unlikely to cause more than burning in the mouth and throat with nausea and vomiting. Most patients will develop very few features. Larger amounts may also cause epigastric pain and diarrhoea. Ulceration and oedema of the upper alimentary tract may occur but is uncommon. Involvement of the larynx causing stridor and breathlessness is rare.

ACUTE HEALTH HAZARDS:

Dose	Route	Signs and symptoms (as acetic acid)
>25 ppm	**Inhalation**	Extreme eye and nasal irritation..
>80%	**Skin, Eyes**	Severe burns. Irreperable damage to eyesight
100%	**Ingestion**	Oesophageal Perforation, intravascular coagulopathy.

CHRONIC HEALTH HAZARDS:
Optic neuropathy has been reported following both acute and chronic inhalation.

CARCINOGENICITY:
Not considered to be carcinogenic.

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SECTION 4: EXPOSURE GUIDELINES AND STANDARDS

ODOUR THRESHOLD: Less than 3 ppm

EU AIR QUALITY GUIDELINE: N/A

DRINKING WATER QUALITY GUIDELINE N/A
(WHO 2004)

WORKPLACE EXPOSURE LIMITS 5 ppm (9.6 mg m^{-3}) as Formic Acid
(UK Health and Safety Executive)

EMERGENCY RESPONSE PLANNING GUIDELINE (ERPG) VALUES (AS FORMIC ACID)
(American Industrial Hygiene Association)

	Listed value (ppm)	Calculated value (mg m^{-3})
ERPG-1*	3	5.8
ERPG-2*	25	48
ERPG-3*	250	480

* *Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hr without experiencing other than mild transient adverse health effects or perceiving objectionable odour.*

** *Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hr without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.*

*** *Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hr without experiencing or developing life-threatening health effects.*

ACUTE EXPOSURE GUIDELINE LEVELS (AEGLs) (U.S. Environmental Protection Agency)

	mg m^{-3}				
	10 min	**30 min**	**60 min**	**4 hr**	**8 hr**
AEGL-1†					
AEGL-2††					
AEGL-3†††					

† *The level of the chemical in air at or above which the general population could experience notable discomfort.*

†† *The level of the chemical in air at or above which there may be irreversible or other serious longlasting effects or impaired ability to escape.*

††† *The level of the chemical in air at or above which the general population could experience lifethreatening health effects or death.*

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SECTION 5: EXPOSURE CONTROLS / PERSONAL PROTECTION

CONTROLS: Fine Water spray for vapours. **DO NOT** add water to fuming liquid or containers

PERSONAL PROTECTIVE EQUIPMENT

EMERGENCY ACTION CODE	Fuming Liquid - EAC 2W, 2P Aqueous Solutions - EAC 2R
RESPIRATORY PROTECTION	Self-contained breathing Apparatus (*BS EN 137*)
EYE PROTECTION	Chemical resistant goggles (*BS EN 166*)
SKIN PROTECTION	Liquid tight chemical resistant (*BS 8428*)
EMERGENCY RESPONDERS	Ambulance staff, paramedics and emergency department staff treating chemicallycontaminated casualties should be equipped with the Department of Health approved, gas-tight (Respirex) decontamination suits based on EN466:1995, EN12941:1998 and prEN943-1:2001, where appropriate.
OTHER PROTECTIVE CLOTHING OR EQUIPMENT	Fuming Liquid - APP B - Gas-tight chemical protective clothing (*BS EN 943 part 2*)

WORK HYGIENIC PRACTICES:

Secondary contamination may occur. Wash skin and hair with copious amounts of preferably warm soapy water for 10 to 15 minutes.

DECONTAMINATION OF RESPONDERS:

Decontamination should be performed using local protocols in designated areas such as a decontamination cubicle with adequate ventilation.

NON ESSENTIAL PERSONNEL / PUBLIC

There may be public safety hazard outside the immediate area of the incident. People should remain indoors with windows and doors closed and ventilation switched off.

Non-essential personnel should move at least 50 m away from the incident in all directions

Risk communication via news media (TV Radio) and social media, as well as internet / telephone advice lines should be initiated to inform local residents / public of latest advice messages.

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SECTION 6: MONITORING AND DETECTION

HEALTH AND SAFETY:

- Use real-time monitoring at scene either electro-chemical such as GASMET or colorimetric tubes e.g. Draeger to measure vapours or decomposition products such as CO.
- Vapours will be heavier than air so may accumulate in voids and low-lying zones.

ENVIRONMENTAL HEALTH:

- Acids are highly reactive, water soluble and are unlikely to persist in the environment.
- Acids will lower pH of waters and other environmental media.
- Fire and heat may lead to generation of particles and toxic gases (CO).
- Use monitoring data, marine and meteorological data to model fate and transport e.g. ALOHA, CALPUFF (USEPA)
- In the absence of data refer to Table 1 below for initial isolation and protective action distances (m) (ERG)

Chemical Name	Spill Size	Definition	Isolation Zone in all directions	DownWind Protection Zone	
				Day	Night
UN 3264	Small	Drum(s)	50	50	50
	Large	Rail Car / Tank(s)	800	800	800

Isolation Distance: All personnel to be directed in a cross wind direction this distance from the spill

Protective Action Zone: A square area down wind of the spill where protective action should be considered, starting with nearest receptors and working away from spill.

Such estimates should always be regarded with reservations and never be alternatives for monitoring.

LONG TERM EPIDEMIOLOGY & PUBLIC HEALTH EFFECTS MONITORING & ASSESSMENT

- Collate GP Referrals, hospital admissions – numbers, symptoms, age, sex, pre-determined
- Biomarkers limited to contact burns / symptoms
- Follow-up surveys where public health may have been impacted

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SECTION 7: FIRST AID MEASURES

Important Notes

- Secondary contamination may occur.
- Ambulance staff, paramedics and emergency department staff treating chemicallycontaminated casualties should be equipped with the Department of Health approved, gas-tight (Respirex) decontamination suits based on EN466:1995, EN12941:1998 and prEN943-1:2001, where appropriate.
- Decontamination should be performed using local protocols in designated areas such as a decontamination cubicle with adequate ventilation.

Dermal exposure

- Remove patient from exposure.
- The patient should remove all clothing and personal effects.
- Double-bag soiled clothing and place in a sealed container clearly labelled as a biohazard.
- Gently blot away any adherent liquid from the patient.
- Wash hair and all contaminated skin with copious amounts of water (preferably warm) and soap for at least 10-15 minutes. Decontaminate open wounds first and avoid contamination of unexposed skin.
- Pay special attention to skin folds, axillae, ears, fingernails, genital areas and feet.
- Burns totally more than 15% of body surface in adults (> 10 % in children) will require standard fluid resuscitation as for thermal burns.
- Cover affected area with a clean non-adherent dressing.

Ocular exposure

- Remove patient from exposure.
- Remove contact lenses if necessary and immediately irrigate the affected eye thoroughly with water or 0.9% saline for at least 10-15 minutes.
- Patients with corneal damage or those whose symptoms do not resolve rapidly should be referred for urgent ophthalmological assessment.

Inhalation

- Remove patient from exposure.
- Ensure a clear airway and adequate ventilation.
- Give oxygen to symptomatic patients. Caution when applying oral resuscitation in case of contamination.
- All patients with abnormal vital signs, chest pain, respiratory symptoms or hypoxia should have a 12 lead ECG performed.
- If the patient has clinical features of bronchospasm treat conventionally with nebulised bronchodilators and steroids.
- Endotracheal intubation, or rarely, tracheostomy may be required for life threatening laryngeal oedema.
- Apply other supportive measures as indicated by the patient's clinical condition.
- May be delayed effects.

Ingestion

- MAINTAIN AIRWAY AND ESTABLISH HAEMODYNAMIC STABILITY
- In severely affected patients critical care input is essential. Urgent assessment of the airway is required. A supraglottic-epiglottic burn with erythema and oedema is usually a sign that further oedema will occur that may lead to airway obstruction. It is an indication for consideration of early intubation or tracheotomy.
- Do **NOT** attempt gastric lavage.
- Do **NOT** give neutralising chemicals as heat produced during neutralization reactions may increase injury.
- Monitor BP, pulse and oxygen saturation.
- Treat haemorrhagic or hypovolaemic shock by replacing lost fluids and blood intravenously.
- Apply other supportive measures as indicated by the patient's condition.

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SECTION 8: FIRE FIGHTING MEASURES

Reacts violently with water generating heat. May generate toxic gases when heated to decomposition. Reacts with oxidisers and caustics.

FLAMMABILITY: Flammable (some forms explosive)

LOWER EXPLOSIVE LIMIT: 5.4% (Acetic) 18% (Formic)

UPPER EXPLOSIVE LIMIT: 16% (Acetic) 57% (Formic)

EXTINGUISHING MEDIA: Water mist for vapours. **DO NOT** add water to liquid acid or containers

SPECIAL FIRE FIGHTING PROCEDURES: Contain run-off (aqueous solutions can be discharged with copious amounts of water)

HAZARDOUS DECOMPOSITION PRODUCTS: Toxic gases (CO)

SECTION 9: RECOVERY RESPONSE AND CLEAN-UP

Special precautions: DO NOT add water to concentrated acid or containers. Acid may corrode certain materials.

INCIDENT MANAGEMENT& RESPONSE
• Use fine water spray to knock-out vapours but avoid water directly onto acid • Contain run-off where possible. Aqueous solutions may be discharged with copious amounts of water • Initiate minimum 50 m exclusion zone in all directions and advise the public to remain indoors with windows and doors closed. Provide advice updates via media. • Monitor and model vapours and liquids.
CLEAN-UP/RECOVERY
• Acids will dissolve in water and will not persist in the environment. • Wastes should be removed via appropriate disposal facilities. • Aqueous solutions of acid can be discharged with copious amounts of water

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SECTION 10: WASTE DISPOSAL

WASTE CATALOGUE CLASSIFICATION : 20 01 14 (or 06 01 01 to 06 01 06 for specific organic acids)

WASTE DISPOSAL METHOD	Use specialist waste disposal contractor for fuming acids and containers etc.
ENVIRONMENTAL	Aqueous solutions can be discharged to sewer with copious amounts of water. Will not persist in the environment. Seek advice before discharge.
PATIENT CLOTHING	Double bag and place in a sealed container labeled as biohazard. Personal effects e.g. jewelry may be decontaminated with water.

Handling & Storage: Store in a dry, well-ventilated place. Separate from oxidizing materials and alkaline substances. Do not eat, drink or smoke in areas of use or storage. Use caution when opening containers, especially in warm weather, i.e.: open outdoors and stay upwind. Metal containers involving the transfer of 5 gallons or more of explosive acids e.g. picric acid should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters. Use only non-sparking tools and equipment, especially when opening or closing containers of this chemical. Wherever this chemical is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings. (TOXNET)

MaritimeTransport Information
Proper Shipping Name: Corrosive liquid, acidic, organic, n.o.s, IMO Packing Group 8, III, Segregation Group: 1 (Acids)

SECTION 11: ECOLOGICAL INFORMATION

Toxicity Data: Due to aqueous solubility, organic acids will not persist in the aquatic environment eventually reacting to form salts such as acetate, and would not be expected to bioaccumulate. Eco toxicity to plants and animals arises from corrosivity and lowering of environmental pH.

Acute toxicity (as various acids)						
Species	Age/Size	Bioassay conditions/analysed parameters				Reference
		Temperature (°C)	Salinity ‰	LC50 -48h	LC50 96h	
Scenedesmus subspicatus (Green algae)	-	-	-	-	25 mg/l	Formic Acid Toxnet HSDB
Fathead minnows	-	18 - 22	0	-	88 mg/l	Acetic Acid Toxnet HSDB
Salmo gairdneri (rainbow trout)	-	-	-	-	110 mg/l	Picric Acid Toxnet HSDB

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SECTION 12: CASE STUDY – MARITIME INCIDENT

On 6 December 1917, in the port of Halifax (Nova Scotia – Canada), the French cargo vessel *Mont Blanc* collided with the Norwegian vessel *Imo*. The *Mont Blanc* went on fire and exploded, killing 2,000 people and injuring thousands of others within several kilometres around the ship. The French ship's crew had been able to abandon ship in time and all but one survived; however 6 of the crew of the *Imo* were killed. The explosion caused a 2-metre high tsunami and a very powerful shockwave, destroying trees and buildings and projecting fragments of boat within a radius of several kilometres. The *Mont Blanc* had been transporting large quantities of munitions to Europe where the First World War was raging: around 2,500 tonnes of explosives, including TNT, guncotton and picric acid. http://www.cedre.fr/en/spill/mont_blanc/mont_blanc.php

SECTION 13: CASE STUDY – REPORTED PUBLIC HEALTH EFFECTS

Due to an accident, workers at a plant producing acetic acid were exposed to an aerosol of acetic acid and acetic acid anhydride during their luncheon in the cafeteria. The acute effects were severe irritation of eyes and upper respiratory tract and, in some cases, dyspnoea. Clinical examination of the 14 exposed persons 2 hours after the accident revealed intense conjunctivitis and acute pharyngo-laryngitis, corneal ulcers, necrotic areas in the nasal mucosa, and spastic bronchitis. Two workers also had second-degree burns on their legs. Upon medical treatment, all had recovered within 25 days. Health Council of Netherlands Publication 2004. http://www.gezondheidsraad.nl/sites/default/files/00@15113.pdf

SECTION 14: SOURCES OF FURTHER INFORMATION

UK Health Protection Agency	**http://www.hpa.org.uk/Topics/ChemicalsAndPoisons/CompendiumOfChemicalHazards/**
Emergency Response Guidebook 2012	http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/ergmenu.aspx
TOXNET Hazardous Substances Database	http://toxnet.nlm.nih.gov/
CAMEO	http://cameochemicals.noaa.gov/
ALOHA	http://www.epa.gov/osweroe1/content/cameo/aloha.htm
CEDRE	http://www.cedre.fr/index-en.php
ARCOPOL	http://www.arcopol.eu/home.aspx
EMSA	http://www.emsa.europa.eu/