HNS MARITIME SAFETY DATA SHEET **FILE NO.: 103** **DATE: 29/11/13**

HYPOCHLORITES DISSOLVER

CAS No: - **UN No: 1791**

C- Corrosive, N – Dangerous to Environment

R31, R34, R50

S1/2, 28, 45, 50

KEY POINTS

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- **Corrosive and toxic by all routes.**
- **Reacts with acids, alkalis and organics producing toxic chlorine gas (see datasheet 001).**
- **Non combustible under normal conditions.**
- **Exposure by any route may be dangerous causing irritation and tissue burns.**
- **Examples include sodium hypochlorite (bleach), calcium hypochlorite.**

HUMAN HEALTH EXPOSURE ROUTES See Section 3

- **Acute exposure can occur via all routes**
- **Causes burns and irritation to exposed tissues**
- **Long-term contact may cause irritation and blistering.**
- **Possible secondary contamination.**

FIRE See Section 8

- **Non combustible under normal conditions**
- **In the event of a fire involving hypochlorite use 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 aqueous solutions in drums or tanks**

REACTIVITY WITH SEA WATER

- **Dissolves forming solution.**
- **Will react with acids, alkalis and organics forming chlorine gas.**
- **Reacts with ammonium compounds producing nitrogen trichloride**

INCIDENT MANAGEMENT

- **Alert Emergency Services.**
- **Non-essential personnel should move at least 50 m away from the incident.**
- **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 contact irritation.**

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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
UN1791					
	General	Drum or several	50 m	50 m	50 m
	Large	Tank / Rail car / Fire	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 (PHE Compendium Sodium Hypochlorite)

Dose	Route	Signs and symptoms
>1 to 5 ppm	Inhalation	Mild to severe irritation (chlorine).
>35 ppm	Inhalation	Potentially lethal. Concentrations above 1000 ppm lethal in minutes (chlorine).
> 10% solution	Ingestion	Corrosive; vomiting, abdominal and retrosternal pain, oesophagitis, diarrhoea, metabolic acidosis.

Monitoring Strategy (Short & Long Term) & Equipment

Occupational	Real time tube or electrochemical detection Chlorine in air. Chlorides.in environmental media
Environmental	Atmospheric Fate and Transport e.g. ALOHA, CALPUF (USEPA) for chlorine.
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.
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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SECTION 1: IDENTIFICATION

NAME:	**Hypochlorite**		**CHEMICAL FORMULA:**	**-**	
SYNONYMS:	**-**				
CAS No:	**-**	**UN No:**	**1791**	**EINECS :**	**-**
CLASSIFICATIONS	**C- Corrosive, N – Dangerous to Environment**				
RISK PHRASES	**R31, R34, R50**				
SAFETY PHRASES	**S1/2, 28, 45, 50**				
USES: Various industrial uses including bleaches, disinfectants and cleaning agents					

SECTION 2: PHYSICAL CHEMICAL PROPERTIES

SEBC CLASSIFICATION	Dissolver	**BOILING POINT**	111 ^{o}C
APPEARANCE	Liquid	**VAPOUR PRESSURE**	Slightly volatile
ODOUR	Unpleasant sweet, chlorine	**SPECIFIC GRAVITY**(air = 1):	>1
FLAMMABILITY	Non-combustible	**SOLUBILITY IN WATER**	**Soluble**
STABILITY & REACTIVITY	Reacts with acids, alkalis and organics to generate chlorine gas. Reacts with ammonium compounds to produce nitrogen trichloride. Decomposes to generate toxic gases when heated to decomposition e.g. Chlorine.		

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SECTION 3: HUMAN HEALTH HAZARDS

ROUTES OF ENTRY: Toxic and Corrosive by all routes

POTENTIAL HEALTH EFFECTS (As Sodium Hypochlorite):

INHALATION	Inhalation of fumes from mixing products may cause irritation of 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 may cause pain, blepharospasm, lacrimation, conjunctivis, palpebral oedema and photophobia.
SKIN	Dermal exposure may cause tissue damage by saponification of fats. This casues liquefaction burns and necrosis with a softening of the tissues which can further lead to deep tissue penetration and full thickness burns.
INGESTION	Ingestion of small amounts can cause a burning sensation in the mouth and throat and thirst. The oropharynx may look mildly inflamed but burns are unlikely. Nausea, retching and haematemesis may occur but are unlikely to be severe. Large amounts (more than 100 mL in a child or 300 mL in adults) cause retrosternal pain due to corrosive oesophagitis, haematemesis, abdominal pain and tenderness, watery diarrhoea and possibly melaena. Repeated vomiting may lead to glottal contamination with subsequent oedema and difficulty in breathing. In severe cases, hypernatraemic, hyperchloraemic acidosis, metabolic acidosis, hypotension, coma, convulsions and cardiorespiratory arrest. The gastrointestinal mucosa may become haemorrhagic, ulcerated and perforated. Shock may then occur. There is greater risk pulmonary oedema (may take up to 36h to develop) with increasing breathlessness, wheeze, hypoxia and cyanosis. ARDS has occurred after bleach ingestion.

ACUTE HEALTH HAZARDS:

Dose	Route	Signs and symptoms (as Sodium Hypochlorite)
>1 to 5 ppm	**Inhalation**	Mild to severe irritation (chlorine).
>35 ppm	**Inhalation**	Potentially lethal. Concentrations above 1000 ppm lethal in minutes (chlorine).
> 10% solution	**Ingestion**	Corrosive; vomiting, abdominal and retrosternal pain, oesophagitis, diarrhoea, metabolic acidosis.

CHRONIC HEALTH HAZARDS:
Repeated skin exposure may lead to irritation and blistering.

CARCINOGENICITY:
Not considered to be carcinogenic.

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SECTION 4: EXPOSURE GUIDELINES AND STANDARDS

ODOUR THRESHOLD: 0.2 to 3.5 ppm

EU AIR QUALITY GUIDELINE: N/A

DRINKING WATER QUALITY GUIDELINE N/A (250 mg/l as Chloride)
(WHO 2004)

WORKPLACE EXPOSURE LIMITS NA
(UK Health and Safety Executive)

TEMPORARY EMERGENCY EXPOSURE LIMIT (TEEL) (AS SODIUM HYPOCHLORITE)
(SCAPA 2012)

	Listed value (ppm)	Value (mg m^{-3})
TEEL-1		2
TEEL-2		20
TEEL-3		630

TEEL-1 is the airborne concentration (expressed as ppm [parts per million] or mg/m^3 [milligrams per cubic meter]) of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour, could experience notable discomfort, irritation, or certain asymptomatic, nonsensory effects. However, these effects are not disabling and are transient and reversible upon cessation of exposure.

TEEL-2 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour, could experience irreversible or other serious, long-lasting, adverse health effects or an impaired ability to escape.

TEEL-3 is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, when exposed for more than one hour, could experience life-threatening adverse health effects or death.

TEELs are intended for use until AEGLs or ERPGs are adopted for chemicals. http://orise.orau.gov/emi/scapa/chem-pacs-teels/default.htm

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

	ppm				
	10 min	**30 min**	**60 min**	**4 hr**	**8 hr**
AEGL-1†	0.5	0.5	0.5	0.5	0.5
AEGL-2††	2.8	2.8	2.0	1.0	0.71
AEGL-3†††	50	28	20	10	7.1

† *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.

PERSONAL PROTECTIVE EQUIPMENT

EMERGENCY ACTION CODE	EAC 2X
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	See datasheet 001 for Chlorine where this is suspected

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 chlorine.
- Vapours will be heavier than air so may accumulate in voids and low-lying zones.

ENVIRONMENTAL HEALTH:

- Hypochlorites are reactive, water soluble and are unlikely to persist in the environment.
- Will oxidise organic materials and can release chlorine gas. Will react with ammonium compounds
- Fire and heat may lead to generation of particles and toxic gases (chlorine).
- 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 1791	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
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.
Apply a soothing cream if there is any residual skin irritation.

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.
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.

Ingestion
Treatment is unlikely to be required if only small amounts have been ingested (less than 100mL in a child; less than 300mL in an adult of household bleach). Give a small glass of milk to drink
Ensure a clear airway and adequate ventilation.
Gastric lavage should **NOT** be undertaken due to the increased risk of aspiration.
Observe asymptomatic patients for at least 6 hours after ingestion. Monitor BP, pulse, cardiac rhythm and respiratory rate.
Apply other supportive measures as indicated by the patient's clinical condition.

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TOXBASE -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:	Non-combustible. Oxidising agent
LOWER EXPLOSIVE LIMIT:	-
UPPER EXPLOSIVE LIMIT:	-
EXTINGUISHING MEDIA:	Water mist or alcohol resistant foam
SPECIAL FIRE FIGHTING PROCEDURES:	Contain run-off
HAZARDOUS DECOMPOSITION PRODUCTS:	Toxic gases (Chlorine)

SECTION 9: RECOVERY RESPONSE AND CLEAN-UP

Special precautions: May react with organic chemicals and ammonium compounds

INCIDENT MANAGEMENT& RESPONSE
• Use fine water spray to knock-out vapours • Prevent run-off entering drains or water courses. • 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
• Hypochlorites will dissolve in water and will not persist in the environment. • Wastes should be removed via appropriate disposal facilities. • Double bag contaminated materials.

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SECTION 10: WASTE DISPOSAL

WASTE CATALOGUE CLASSIFICATION : 16 09 04 (Sodium Hypochlorite)

WASTE DISPOSAL METHOD	Use specialist waste disposal contractor.
ENVIRONMENTAL	Prevent run-off entering drains or water courses Will not persist in the environment.
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 (as Sodium Hypochlorite): Store at a temp not exceeding 20 ^{o}C away from acids and out of direct sunlight.Solutions in water are storage hazards due to oxygen evolution. (TOXNET).

MaritimeTransport Information
Proper Shipping Name:Hypochlorite Solution, IMO Packing Group 8, III (UNECE)

SECTION 11: ECOLOGICAL INFORMATION

Toxicity Data: Due to aqueous solubility, hypochlorites will not persist in the aquatic environment reacting with organic materials releasing chlorine, and would not be expected to bioaccumulate. Eco toxicity to plants and animals arises from oxidation effects.

Acute toxicity						
Species	Age/Size	Bioassay conditions/analysed parameters				Reference
		Temperature (°C)	Salinity ‰	LC50 -48h	LC50 96h	
Gasterosteus aculeatus	Juvenile and adult	14.8 (pH8)	Marine	-	0.14 – 0.19 mg/l	Sodium hypochlorite IUCLID
Alburnus alburnus	-	10	0.7	-	32 - 37 mg/l	Sodium hypochlorite IUCLID
Daphnea magna (crustacean)	-	20	-	-	2.1 mg/l	Sodium hypochlorite IUCLID

http://esis.jrc.ec.europa.eu/doc/IUCLID/data_sheets/7681529.pdf

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SECTION 12: CASE STUDY – MARITIME INCIDENT

In July 1999, the *CMA Djakarta* was off the coast of Cyprus when there was an explosion on deck followed by a fire. Despite significant efforts, the crew could not control the fire and further explosions occurred. The vessel was abandoned and subsequently grounded off the Egyptian coast where salvors took over. The fire was eventually put out and the vessel was towed to Malta as a port refuge and then to Croatia for repairs. Investigations were carried out and it appeared that the explosions and fire on deck had been caused by a cargo of calcium hypochlorite. This product had self-combusted, possibly as a result of impurities, either due to the manufacturing process of such bleaching powder or as a result of contamination during transport.
http://www.cedre.fr/en/spill/djakarta/djakarta.php

SECTION 13: CASE STUDY – REPORTED PUBLIC HEALTH EFFECTS

See Arcopol Chlorine Datasheet 001

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/