



# Liar, Liar Ship on Fire, Now What?

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MINTON, TREHARNE  
& DAVIES GROUP



# MISDECLARED CARGOES & CONTAINER SHIP FIRES



04<sup>th</sup> October 2019



Richard Minton

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## AIMS OF PRESENTATION

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- To introduce and explain the requirements of the International Maritime Dangerous Goods (IMDG) Code in the context of containerised “Dangerous Goods” cargoes
- To provide an example of a commonly seen problem cargo that highlights the risks of carriage of misdeclared “Dangerous Goods” on container ships

Section 01

# BACKGROUND

# BACKGROUND

Section 01



## BACKGROUND

### Section 01

## TT CLUB - FACTS & FIGURES

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- International Cargo Handling Coordination Association has calculated that of the 60 million packed containers moved each year, around 10% of these containerised shipments are declared as “Dangerous Goods”
- Published Governmental inspections suggest that 20% of these “Dangerous Goods” are either poorly packed or incorrectly identified
- Scale of risk is elevated when undeclared or misdeclared consignments are taken into account
- The TT Club has recently estimated that a major container ship fire occurs on average every 60 days

# BACKGROUND

## Section 01



# BACKGROUND

Section 01





# BACKGROUND

Section 01



Section 02

# IMDG CODE

## IMDG CODE

### Section 02

## DANGEROUS GOODS

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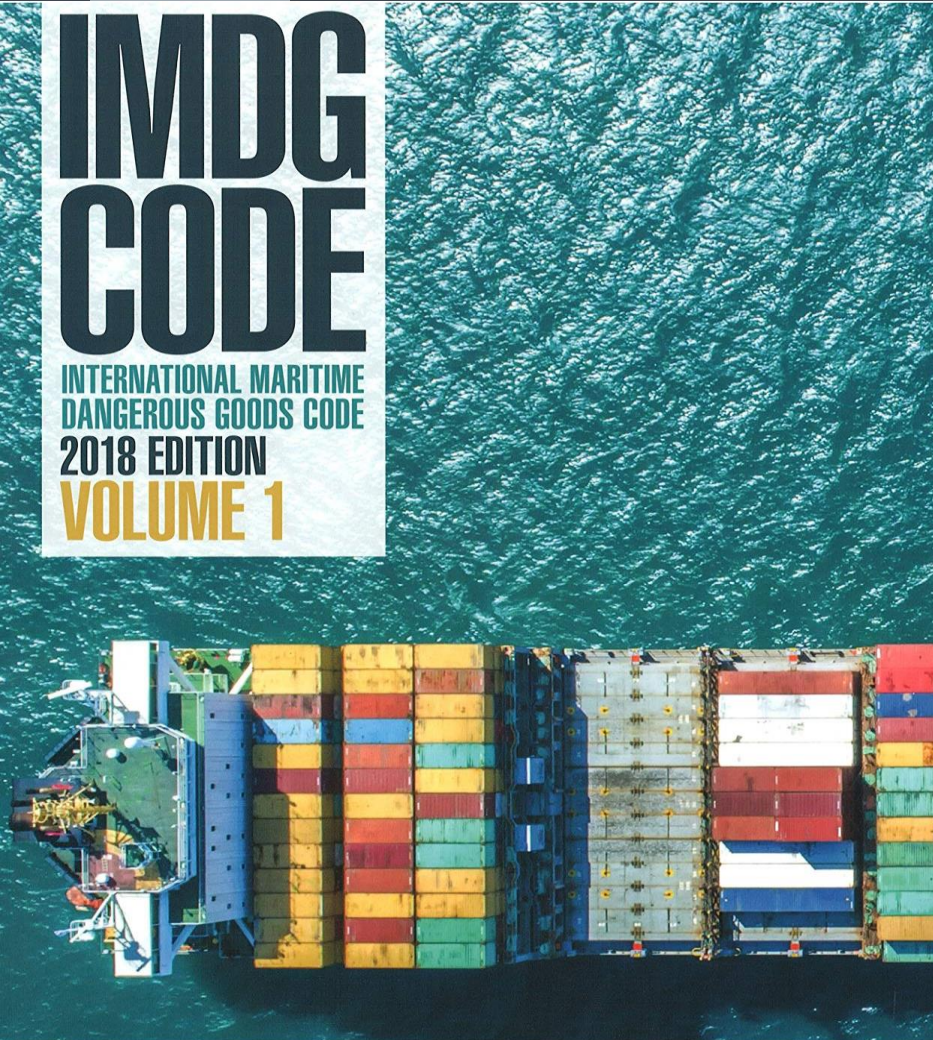
- Chapter VII of the International Convention for the Safety of Life at Sea (SOLAS) covers the carriage of dangerous goods, recognising two forms:
  - In “Bulk” form, as a solid, liquid or liquefied gas (covered by the IMSBC, IBC and IGC codes, respectively)
  - In “Packaged” form, covered by the International Maritime Dangerous Goods (IMDG) code

# IMDG CODE

Section 02

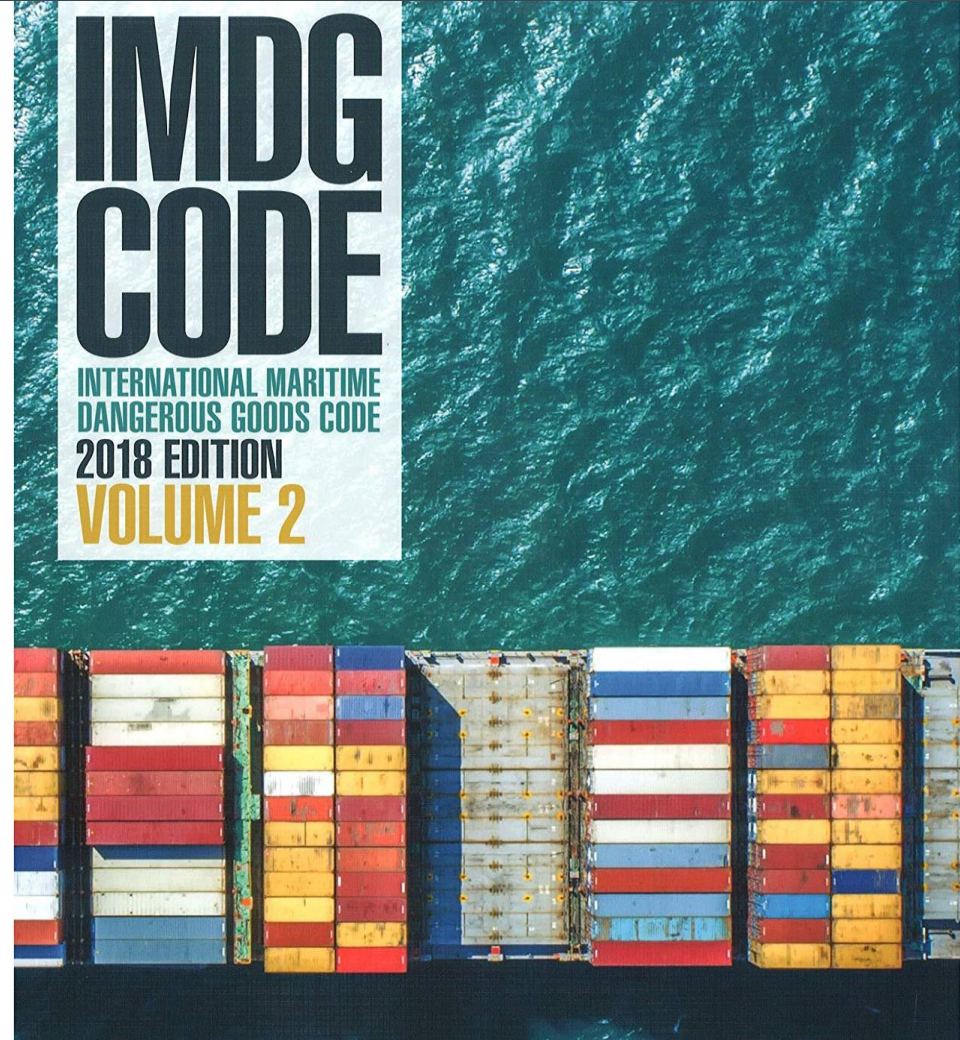
# IMDG CODE

INTERNATIONAL MARITIME  
DANGEROUS GOODS CODE  
2018 EDITION  
VOLUME 1



# IMDG CODE

INTERNATIONAL MARITIME  
DANGEROUS GOODS CODE  
2018 EDITION  
VOLUME 2



# IMDG CODE

## Section 02

## DANGEROUS GOODS

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- SOLAS defines dangerous goods as “...the substances, materials and articles covered by the IMDG code” and states that the “...carriage of dangerous goods in packaged form shall be in compliance with the relevant provisions of the IMDG code”
- “The classification shall be made by the shipper/consignor or by the appropriate competent authority where specified in this Code”

# IMDG CODE

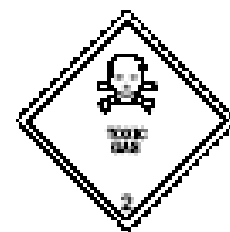
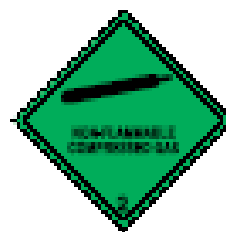
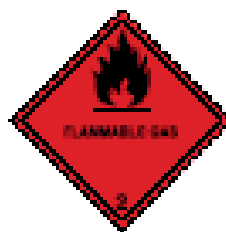
## Section 02

### CLASS 1



Explosive substances and articles

### CLASS 2 – GASES

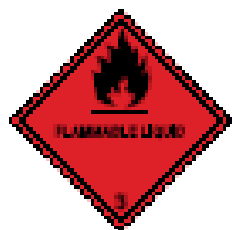


Flammable gas

Non-flammable gas

Toxic gas

### CLASS 3



Flammable liquid

### CLASS 4.1



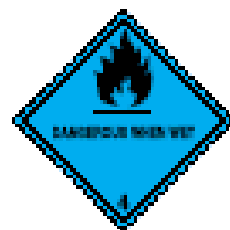
Flammable solid

### CLASS 4.2



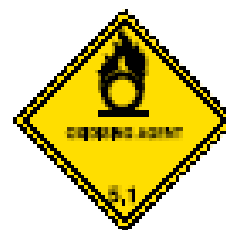
Liable to spontaneous combustion

### CLASS 4.3



Flammable on contact with water

### CLASS 5.1



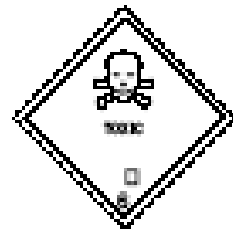
Oxidising agent

### CLASS 5.2



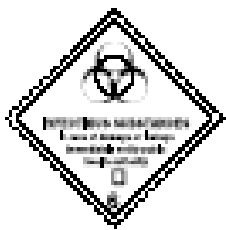
Organic peroxide

### CLASS 6.1



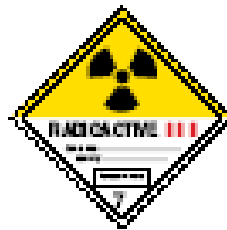
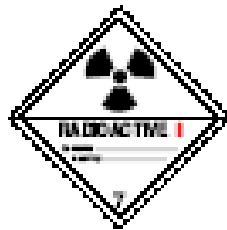
Toxic

### CLASS 6.2



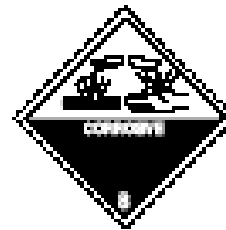
Infectious substance

### CLASS 7



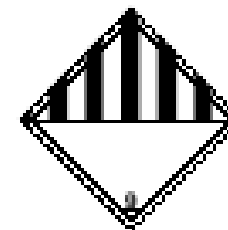
Radioactive material

### CLASS 8



Corrosive

### CLASS 9



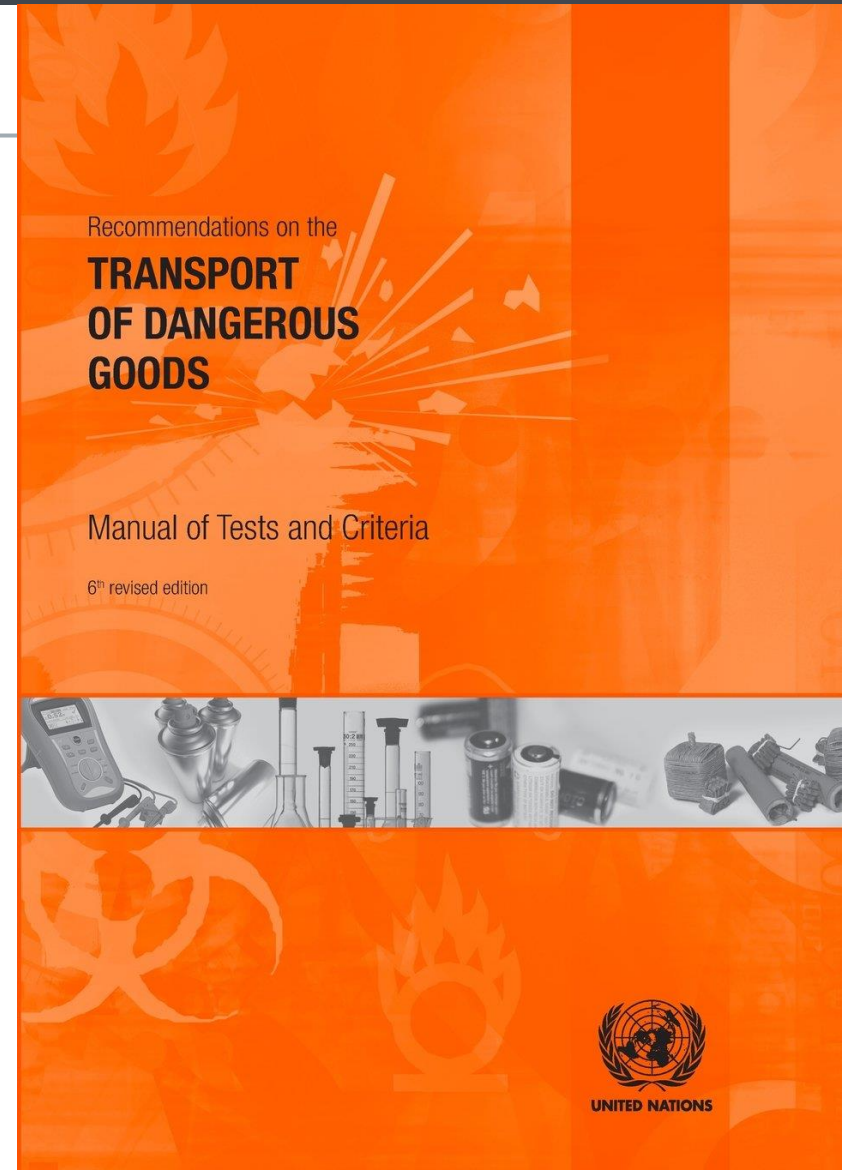
Miscellaneous

## IMDG CODE

## Section 02

## UN MANUAL OF TESTS &amp; CRITERIA

- *“The purpose of this text is to present the United Nations schemes for the classification of certain types of dangerous goods and to give descriptions of the test methods and procedures considered to be the most useful for providing competent authorities with the necessary information to arrive at a proper classification of substances and articles for transport”*



# IMDG CODE

## Section 02

## DANGEROUS GOODS

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- For each entry, the IMDG code prescribes:
  - UN Number
  - Proper Shipping Name (PSN)
  - Packing group
  - Special provisions
  - Limited quantities
  - Packing instructions and provisions (Including IBC or Tanks)
  - Emergency Schedule (EmS) for spill and firefighting measures
  - Stowage and Segregation
  - Properties and Observations



## IMDG CODE

### Section 02

## WHAT SHOULD HAPPEN

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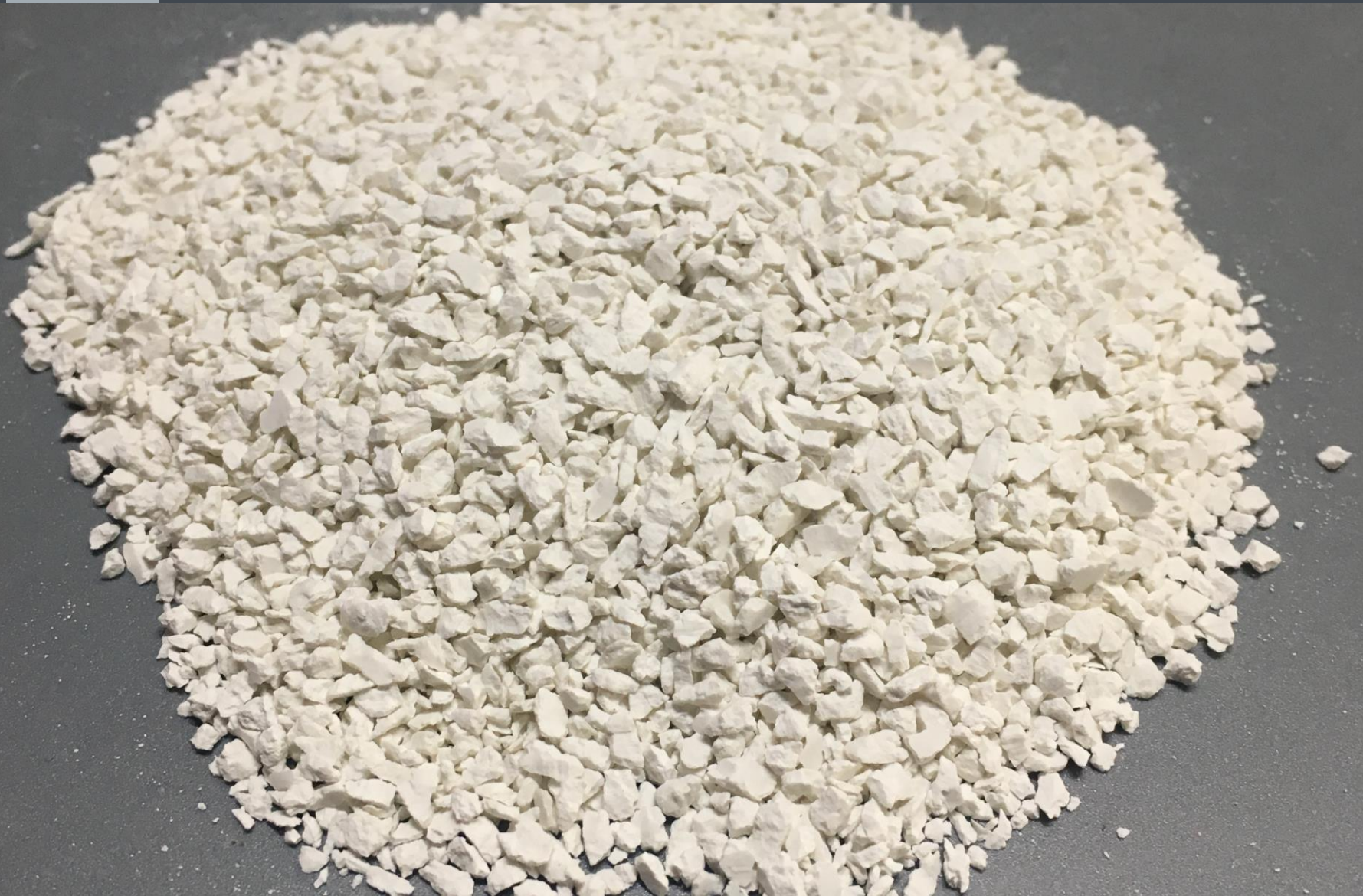
- The hazards associated with the dangerous goods should be identified, along with the level of danger and subsidiary risk
- A Proper Shipping Name and UN Number should be provided, as per the dangerous cargo list
- Any special provisions for carriage should be identified
- This information should then be communicated to the carrier in the dangerous goods transport documents – these documents must remain with the shipment and be handed over to the Consignees at the final destination
- The goods should be packed appropriately in line with the requirements of the IMDG code
- The material should be properly stowed on-board the Vessel

Section 03

# CALCIUM HYPOCHLORITE

# CALCIUM HYPOCHLORITE

Section 03



# CALCIUM HYPOCHLORITE

Section 03



# CALCIUM HYPOCHLORITE

Section 03

## WHAT IS IT?

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### Properties and observations

(17)

White or yellowish corrosive solid (powder, granules or tablets) with chlorine-like odour. Soluble in water. May cause fire in contact with organic material or ammonium compounds. Substances are liable to exothermic decomposition at elevated temperatures.

This condition may lead to fire or explosion. Decomposition can be initiated by heat or by impurities (e.g. powdered metals (iron, manganese, cobalt, magnesium) and their compounds). Liable to heat slowly. Reacts with acids, evolving chlorine, an irritating, corrosive and toxic gas. In the presence of moisture, corrosive to most metals. Causes burns to skin, eyes and mucous membranes.

# CALCIUM HYPOCHLORITE

## Section 03

CALCIUM HYDRIDE	-	4.2	1923
Calcium hydrogen sulphite solution, see	-	4.3	1404
CALCIUM HYDROSULPHITE	-	8	2693
CALCIUM HYPOCHLORITE, DRY with more than 39% available chlorine (8.8% available oxygen)	P	5.1	1748
CALCIUM HYPOCHLORITE, DRY, CORROSIVE with more than 39% available chlorine (8.8% available oxygen)	P	5.1	3485
CALCIUM HYPOCHLORITE, HYDRATED with not less than 5.5% but not more than 16% water	P	5.1	2880
CALCIUM HYPOCHLORITE, HYDRATED MIXTURE, CORROSIVE with not less than 5.5% but not more than 16% water	P	5.1	3487
CALCIUM HYPOCHLORITE, HYDRATED, CORROSIVE with not less than 5.5% but not more than 16% water	P	5.1	3487
CALCIUM HYPOCHLORITE, HYDRATED MIXTURE with not less than 5.5% but not more than 16% water	P	5.1	2880
CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 10% but not more than 39% available chlorine	P	5.1	3486
CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 39% available chlorine (8.8% available oxygen)	P	5.1	3485
CALCIUM HYPOCHLORITE MIXTURE, DRY with more than 10% but not more than 39% available chlorine	P	5.1	2208
CALCIUM HYPOCHLORITE MIXTURE, DRY with more than 39% available chlorine (8.8% available oxygen)	P	5.1	1748
CALCIUM MANGANESE SILICON	-	4.3	2844
Calcium naphthenate in solution, see	P	9	3082

# CALCIUM HYPOCHLORITE

Section 03

## UN NUMBER, PROPER SHIPPING NAME & CLASS

UN No.	Proper shipping name (PSN)	Class or division	Subsidiary risk(s)	Packing group	Special provisions	Limited and excepted quantity provisions		Packing		IBC		For use in and bulk containers		Hazard labels	Storage and handling	Segregation	Preparation instructions	
						Limited quantities (7a)	Excepted quantities (7b)	Instructions (8)	Provisions (9)	Instructions (10)	Provisions (11)	Tank instructions (13)	Provisions (14)					
(1)	(2) 3.1.2	(3) 2.0	(4) 2.0	(5) 2.0.1.3	(6) 3.3	(7a) 3.4	(7b) 3.5	(8) 4.1.4	(9) 4.1.4	(10) 4.1.4	(11) 4.1.4	(12)	(13) 4.2.5 4.3	(14) 4.2.5	(15) 5.4.3.2 7.8	(16a) 7.1 7.3-7.7	(16b) 7.2-7.7	(17)
3484	HYDRAZINE AQUEOUS SOLUTION, FLAMMABLE with more than 37% hydrazine, by mass	8	3 6.1	I	-	0	E0	P001	-	-	-	-	T10	TP2 TP13	F-E, S-C	Category D SW2	SG5 SG8 SG35	Colourless flammable liquid. Powerful reducing agent, burns readily. Toxic if swallowed, by skin contact or by inhalation. Causes burns to skin, eyes and mucous membranes. Reacts violently with acids.
3485	CALCIUM HYPOCHLORITE, DRY, CORROSIVE or CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 39% available chlorine (8.8% available oxygen)	5.1	8 P	II	314	1 kg	E2	P002	PP85	-	-	-	-	-	F-H, S-Q	Category D SW1 SW11	SG35 SG38 SG49 SG53 SG60	White or yellowish corrosive solid (powder, granules or tablets) with chlorine-like odour. Soluble in water. May cause fire in contact with organic material or ammonium compounds. Substances are liable to exothermic decomposition at elevated temperatures. This condition may lead to fire or explosion. Decomposition can be initiated by heat or by impurities (e.g. powdered metals (iron, manganese, cobalt, magnesium) and their compounds). Liable to heat slowly. Reacts with acids, evolving chlorine, an irritating, corrosive and toxic gas. In the presence of moisture, corrosive to most metals. Causes burns to skin, eyes and mucous membranes.
3486	CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 10% but not more than 39% available chlorine	5.1	8 P	III	314	5 kg	E1	P002	PP85	-	-	-	-	-	F-H, S-Q	Category D SW1 SW11	SG35 SG38 SG49 SG53 SG60	White or yellowish corrosive solid (powder, granules or tablets) with chlorine-like odour. Soluble in water. May cause fire in contact with organic material or ammonium compounds. Substances are liable to exothermic decomposition at elevated temperatures. This condition may lead to fire or explosion. Decomposition can be initiated by heat or by impurities (e.g. powdered metals (iron, manganese, cobalt, magnesium) and their compounds). Liable to heat slowly. Reacts with acids, evolving chlorine, an irritating, corrosive and toxic gas. In the presence of moisture, corrosive to most metals. Causes burns to skin, eyes and mucous membranes.

UN No.	Proper Shipping Name (PSN)	Class or Division
3485	CALCIUM HYPOCHLORITE, DRY, CORROSIVE or CALCIUM HYPOCHLORITE MIXTURE, DRY, CORROSIVE with more than 39% available chlorine (8.8% available oxygen)	5.1

Known incorrect names:

Calcium Chloride, BK Powder, Bleaching powder, CCH, Disinfectant, Hy-chlor, Chloride of lime, Chlorinated lime, Calcium chlorohydrochlorite, Calcium hypochloride, Calcium oxychloride, Hypochlorous acid, Caporit, Hth, calcium salt

# CALCIUM HYPOCHLORITE

Section 03

## SPECIAL PROVISIONS

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- 312 Vehicles powered by a fuel cell engine shall be consigned under the entries UN No. 3166 VEHICLE, FUEL CELL, FLAMMABLE GAS POWERED or UN No. 3166 VEHICLE, FUEL CELL, FLAMMABLE LIQUID POWERED, as appropriate. These entries include hybrid electric vehicles powered by both a fuel cell and an internal combustion engine with wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the battery(ies) installed.
- Other vehicles which contain an internal combustion engine shall be consigned under the entries UN 3166 VEHICLE, FLAMMABLE GAS POWERED or UN 3166 VEHICLE, FLAMMABLE LIQUID POWERED, as appropriate. These entries include hybrid electric vehicles powered by both an internal combustion engine and wet batteries, sodium batteries, lithium metal batteries or lithium ion batteries, transported with the batteries installed.
- 314 .1 These substances are liable to exothermic decomposition at elevated temperatures. Decomposition can be initiated by heat or by impurities (e.g. powdered metals (iron, manganese, cobalt, magnesium) and their compounds).
- .2 During the course of transport, these substances shall be shaded from direct sunlight and all sources of heat and be placed in adequately ventilated areas.
- 315 This entry shall not be used for class 6.1 substances which meet the inhalation toxicity criteria for packing group I described in 2.6.2.2.4.3.



# CALCIUM HYPOCHLORITE

## Section 03

### PACKAGING

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- The temperature at which the self-accelerating reaction occurs depends on the type, size and shape of the packaging
- IMDG Code defines what packaging can be used for calcium hypochlorite as currently set out in Part 4, Chapter 4.1, Table P002. This allows various types of drum, box or jerrican. Provision PP85 states that bags are not allowed
- The International Group of P&I Clubs has produced guidance on the shipment of this cargo and therein stipulates that the packaging used should be plastic drums of not more than 45kg, whilst the total quantity per container should be not more than 14 tons
- This guidance is based on research into the thermal stability of calcium hypochlorite that was published in 1999 by the IMO

# CALCIUM HYPOCHLORITE

## Section 03

## STOWAGE & SEGREGATION

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- Stowage
  - For cargo ships:
    - “Stowage Category D” = ON DECK ONLY
    - “SW1” = Protected from sources of heat
    - “SW11” = Cargo transport units shall be shaded from direct sunlight. Packages in cargo transport units shall be stowed so as to allow for adequate air circulation throughout the cargo
- Segregation
  - Class 4.1 (Flammable Solids, Self-Reactive Substances and Desensitized Explosives)
  - Acids
  - Ammonium
  - Cyanides
  - Liquid organic substances
  - Peroxides

# CALCIUM HYPOCHLORITE

Section 03



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Section 03



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# CALCIUM HYPOCHLORITE

Section 03



# CALCIUM HYPOCHLORITE

Section 03

## FIRE INVESTIGATIONS

Partage by		Place of receipt (*)				
Vessel	Voy	Port of loading	CONTAINERS STATUS			
CMA CGM BALZAC	NX220H	XINGANG, CHINA				
Port of discharge		Place of delivery (*)				
MOMBASA, KENYA		MOMBASA, KENYA				
CARRIER'S RECEIPT		PARTICULARS FURNISHED BY SHIPPER - CARRIER NOT RESPONSIBLE				
Seal Nos	Mark and Num Containers Nos	Number of Containers/Packages	Kind of Packages	Description of Goods	Gross Weight	Measurement
N/M	408 DRUMS	18	36MTS	WHITENING AGENT IDE NO. 509020107 SHIPPED ON BOARD	19228 KGS	20.113
<u>CAX02183856</u>		1090870	408	19228	20	CY/CY 20' GP

SHIPPED ON BOARD

*[Handwritten signature]*

## CALCIUM HYPOCHLORITE

Section 03

**MATERIAL SAFETY DATA SHEET****Whitening Agent**

**Main Chemical Composition:** Stilbene derivative

**Specification: Appearance:**

Slight yellow powder

Fluorescent Color: Similar to the standard sample

Whitening strength:  $100 \pm 3$  (compared with standard sample)

Moisture:  $\leq 5\%$

Fineness (80 mesh residue):  $\leq 5\%$

**NO KNOWN HAZARDS TO ACCOUNT FOR INCIDENT**



# CALCIUM HYPOCHLORITE

## Section 03



# CALCIUM HYPOCHLORITE

Section 03

<u>TESTS</u>	<u>UNITS</u>	<u>METHOD</u>	<u>RESULTS</u>
Calcium content	%wt	D/SGS TW 12(AAS)	38.82
Iron content	%wt	D/SGS TW 12(AAS)	0.084
Sodium content	%wt	D/SGS TW 12(AAS)	0.021
Vanadium content	%wt	D/SGS TW 12(AAS)	0.018
Chlorides as NaCl	%wt	ASTM C 471	0.271
Copper content	ppm	D/SGS TW 12(AAS)	2.28
Manganese content	ppm	D/SGS TW 12(AAS)	22.15
Magnesium content	ppm	D/SGS TW 12(AAS)	28.35

## CALCIUM HYPOCHLORITE

Section 03

# PRIDE YEAR MARKETING LIMITED

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P.O. Box 66463 – 00800, Nairobi – Kenya.

Tel: 254 - 20 - 558687; Fax: 254 - 20 - 4448187; 558687

1748 CALCIUM HYPOCHLORITE, DRY or  
CALCIUM HYPOCHLORITE MIXTURE,  
DRY with more than 39% available  
chlorine (8.8% available oxygen)

5.1

Product Name: WHITENING AGENT

UN No. 1748

Dangerous Risk: NOT ALLOCATED

# CALCIUM HYPOCHLORITE

Section 03



# CALCIUM HYPOCHLORITE

Section 03



# CALCIUM HYPOCHLORITE

## Section 03



# CALCIUM HYPOCHLORITE

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## CALCIUM HYPOCHLORITE

Section 03

REGIDESO	4988 DRUMS
REPUBLIQUE	
DEMOCRATIQUE DU	<u>226500KG CALCIUM CHLORIDE</u>
CONGO	IMPORT LICENCE NUMBER
CONTRAT	DEC0047279-472A-IB
NO:N044/DGCMP/DG/DRE	THE CREDIT NUMBER:CDI13000019
/D1/K.L/2013	DATE OF ISSUE:130425
<u>HYPOCHLORITE DE</u>	THE NAME IF ISSUING
<u>CALCIUM</u>	BANK:BICDCDKI
POIDS BRUT:47.5KG	GROSSWEIGHT:239175KGS
POIDS NET:45KG	MEASUREMENT:240CBM
REGIDESO	COUNTRY OF ORIGIN:CHINA



Section 04

# SUMMARY

## SUMMARY

### Section 03

## SUMMARISING COMMENTS

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- The implications of mis-declaring dangerous goods are enormous, including potential loss of lives, huge cargo losses and ship damage
- When something does go wrong, determining the cause of a fire and/or explosion can be extremely challenging
- Calcium hypochlorite is only one cargo that can lead to serious fire and explosion incidents



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CONSULTANCY  
ANALYSIS & TESTING  
TRAINING & CERTIFICATION

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