



# **AEBN SERIES 1: Dangerous Goods, Hazardous Substances and GHS Workshop Webinar**

**26 October 2022**

Presented by

**Australian Environment Business Network (AEBN)**

**[www.aebn.com.au](http://www.aebn.com.au)**

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Ross has over 35 years experience in chemical safety – specifically in dangerous goods and hazardous substances.

Ross' specialty is in risk management, in particular, in occupational health and safety, environmental and quality management (OHSEQ). His experience covers such industries as chemical and petrochemical, mining and metals, automotive, manufacturing, timber, pulp and paper, construction, aviation, local government, roads, and the health sectors.

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# Agenda

- Hazardous substances and dangerous goods
  - Legal compliance framework
- Safety Data Sheets
- Hazardous Substances
  - Approved Criteria vs. GHS
  - Globally Harmonised System
  - GHS Labelling
- Dangerous Goods
  - Terminology
  - Classes
- Packaging
- Storage and Handling
- Road and Rail Transport

# Objectives

- To be able to identify and be aware of the hazards of Dangerous Goods
- To make the Storage and Handling of Dangerous Goods safer
- Understand the Regulations and the Dangerous Goods terminology
- Your responsibilities
- Packaging and Labeling
- Segregation

# Why it matters?



# Australia has separate Legislation covering

- Dangerous Goods
  - Hazardous Substances
  - Hazardous Chemicals
  - Scheduled Poisons
  - Security Sensitive Chemicals
  - Pharmaceuticals
  - Agricultural Chemicals
- Today's focus

# Dangerous Goods vs. Hazardous Substances vs. Hazardous Chemicals

- The term “Dangerous Goods” applies to chemicals which present immediate hazards during transport, and in Victoria and Western Australia, during storage and handling.
  - In other States, “Dangerous Goods” in storage and handling are technically known as “Schedule 11 Hazardous Chemicals”
  - In New Zealand, DG storage and handling falls under Hazardous Substances regulations
- “Hazardous Substances” are classified under GHS based on a wider range of hazards, including harm to people during short and long-term exposure, and harm to the environment.
  - In states other than VIC, these are called “Hazardous Chemicals” in the workplace.



# Dangerous Goods vs. Hazardous Substances vs. Hazardous Chemicals (Cont...)

- It is confusing!
- In this workshop, I will mainly use Victorian terminology, i.e.
  - Dangerous Goods – as classified under the *Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)*, whether in the workplace or during transport
  - Hazardous Substances – as classified under the *Globally Harmonized System for the Classification and Labelling of Chemicals (GHS)*

# Hazardous Substances that are Dangerous Goods



# Hazardous Substances that are not Dangerous Goods



# Dangerous Goods

- Substances which constitute a hazard from **explosion, fire, toxicity, corrosivity or radioactivity**

*and*

Which are identified by **Class Labels**

*and*

Have a **UN Number**





# What are Dangerous Goods?

- Substances which can pose a threat to
  - Persons
  - Property
  - The environment
- From
  - Explosion
  - Fire
  - Poisoning
  - Corrosion

In most cases they pose a short-term risk

# What are Hazardous Substances?

Can pose both short and long-term risks:

## *Physical hazards*

- Explosion
- Fire
- Poisoning
- Radioactivity
- Corrosion



## *Health hazards*

- Very toxic
- Toxic
- Harmful
- Corrosive
- Irritant
- Carcinogenic – cause cancer
- Mutagenic – cell mutation
- Sensitising – allergic reactions
- Teratogenic – birth defects



## *Environmental hazards*

- To aquatic life
- To terrestrial vertebrates
- Ozone depleting



# White King bleach

- Dilute sodium hypochlorite (“pool chlorine”)
  - Is not a Dangerous Good
- Can cause eye damage and skin irritation
  - Is a Hazardous Substance



# Diesel fuel

- Has a high flashpoint – will not ignite easily
  - Is not a Dangerous Good
- Can cause dermatitis and will irritate the eyes
  - Is a Hazardous Substance





# Rexona deodorant

- Flammable Gas of Class 2.1, UN 1950 (Aerosol)
  - Is a Dangerous Good
  - Is a Hazardous Substance (Physical hazard only)



# Benzene

- Flammable Liquid of Class 3
  - Is a Dangerous Good
- Proven Carcinogenic Material
  - Is a Hazardous Substance



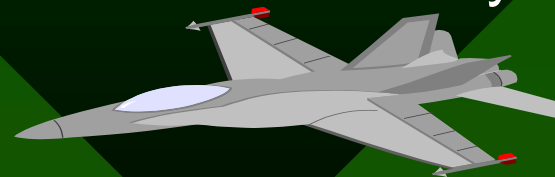
# Regulatory framework

# Hazardous Substances

- Hazardous Chemicals regulated in nationally harmonised Work Health & Safety (WHS) laws:
  - ACT, NSW, NT, QLD, TAS, SA, WA, Commonwealth
- In VIC, Hazardous Substances are regulated under existing OHS Regulations
  - WA has adopted WHS laws in 2022, but Dangerous Goods remain outside
- National review of WHS laws in 2019
- GHS edition 7 adopted as of 1-Jan-2021 – 2-year transition period (replacing edition 3)

# Storage & Handling of Dangerous Goods

- In ACT, NSW, NT, QLD, SA and TAS storage and handling of Dangerous Goods is covered by WHS Regulations
  - Referred to as “Schedule 11 Hazardous Chemicals”
- In VIC and WA this is covered in Dangerous Goods legislation
  - WA adopted harmonised WHS legislation on 31 March 2022, but maintains separate dangerous goods legislation, subject to review in 2 years



# Dangerous Goods Transport

- Not covered by the Work Health & Safety (WHS) regulations for hazardous chemicals.
- These continue to be covered by state-based transport laws and the Australian Dangerous Goods (ADG) Code.

# Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

- Issued by National Transport Commission (NTC)
- ADG7.7
  - Adopted from 1 October 2020
  - Mandatory from 1 October 2021
  - Derived from UN Recommendations on the Transport of Dangerous Goods 21<sup>st</sup> Edition (UN21)
- Reviewed 2-yearly
  - Draft ADG 7.8 released 29/10/21.
  - Full implementation expected by 1/10/23.
- Model Act For The Transport of Dangerous Goods by Road and Rail 2007
  - Model Subordinate Law for the Transport of Dangerous Goods By Road And Rail
- Other codes
  - IMDG Code (sea transport)
  - IATA Regulations (air transport)

Recommendations on the

# TRANSPORT OF DANGEROUS GOODS

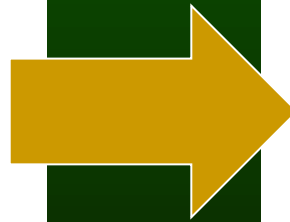
Model Regulations

Volume I

*Twenty-first revised edition*



UNITED NATIONS



Australian Code for the Transport of  
Dangerous Goods by Road & Rail

Edition 7.7, 2020



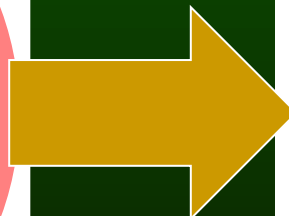
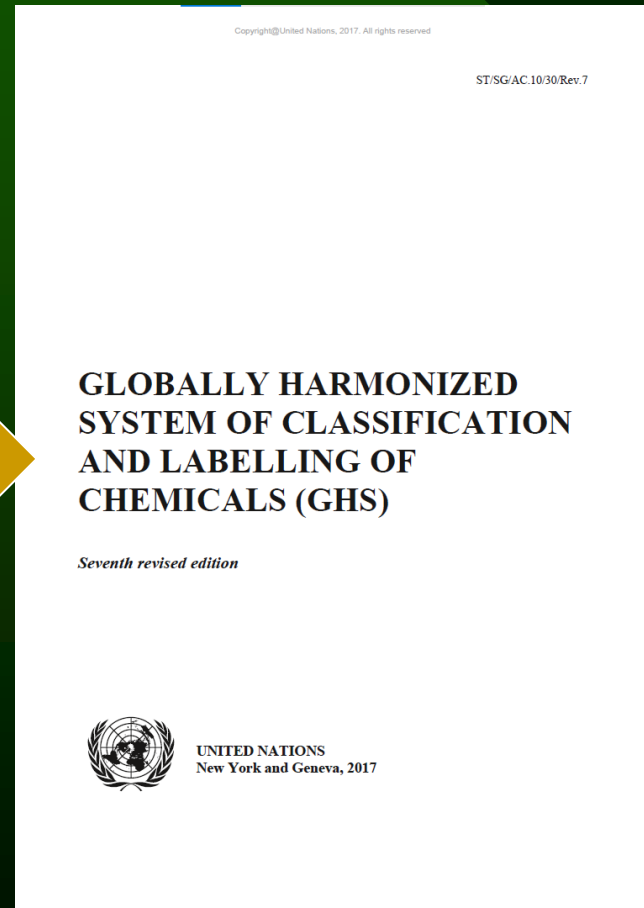
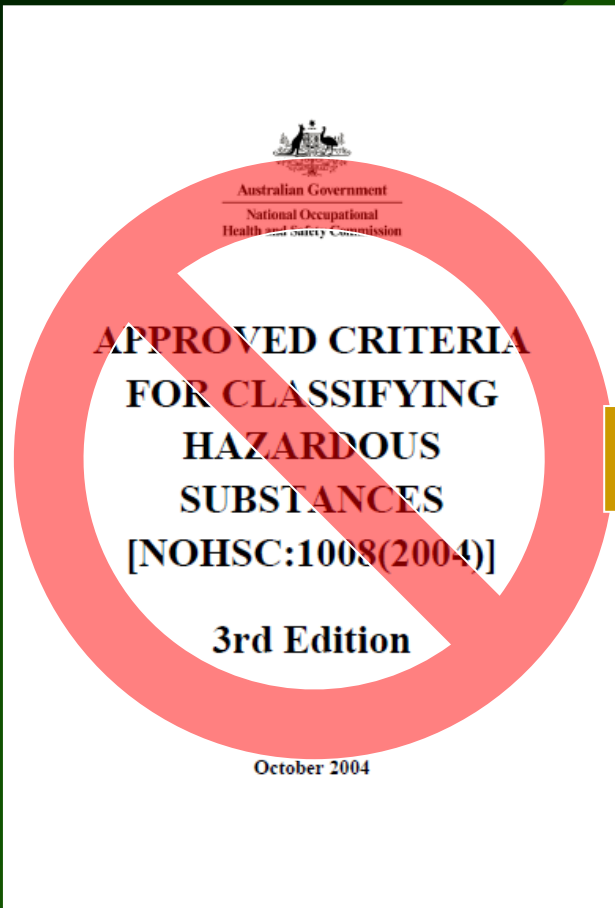
Electronic version [www.ntc.gov.au](http://www.ntc.gov.au)

National  
Transport  
Commission 



# Hazardous Substances

- ~~Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008 (2004)]~~
  - ~~NOHSC – National OHS Commission – now Safe Work Australia~~
- Can still be used in WA for 12 months after the WHS laws were adopted
  - i.e. until 31/3/2023
- Work Health & Safety legislation
  - National Code of Practice
  - Globally Harmonised System of Classification and Labelling of Chemicals (GHS, Edn. 3) mandatory from 1/1/2017
  - GHS Edition 7 adopted from 1/1/2021 with 2-year transition – i.e. mandatory from 1/1/2023



# Regulation – Victoria

- Dangerous Goods
- Dangerous Goods Act 1985
  - Dangerous Goods (Storage & Handling) Regulations 2012
    - Code of practice for the storage and handling of dangerous goods 2013
  - To be replaced by new DG (S&H) Regs 2022 on 27/11/22
    - Minor changes only
  - Dangerous Goods (Road & Rail Transport) Regulations 2018
- Hazardous Substances
- Occupational Health & Safety Act 2004
  - Occupational Health & Safety Regulations 2017 PART 4.1—HAZARDOUS SUBSTANCES
    - Compliance code: Hazardous substances

# Regulation – NSW



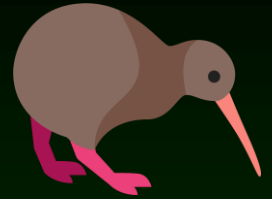
- Dangerous Goods
- Dangerous Goods (Road and Rail Transport) Act 2008 (NSW)
  - Dangerous Goods (Road and Rail Transport) Regulation 2014
- Storage & handling EXCLUDED
  - National Codes of Practice
    - Managing Risks of Hazardous Chemicals in the Workplace
    - Labelling of Workplace Hazardous Chemicals
    - Preparation of Safety Data Sheets for Hazardous Chemicals
  - Hazardous Substances
  - Work Health and Safety Act 2011 (NSW)
    - Work Health and Safety Regulation 2017 Part 7.1 Hazardous chemicals
    - Division 3 Subdivision 2 Manifest of Schedule 11 hazardous chemicals (equivalent to Dangerous Goods storage & handling)

# Regulation – WA

- Dangerous Goods
- Dangerous Goods Safety Act 2004
  - Dangerous Goods Safety (General) Regulations 2007
  - Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007
    - Guide – Dangerous Goods Safety (Storage and Handling of Non-explosives)
  - Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007
- Hazardous Substances
- Work Health and Safety Act 2020 (WA)
  - Work Health and Safety (General) Regulations 2022 Part 7.1 Hazardous chemicals
    - Approved code of practice – Managing risks of hazardous chemicals in the workplace



# Regulation – New Zealand



- In NZ Dangerous Goods transport is covered by the **Land Transport Rule: Dangerous Goods 2005**
  - Administered by NZ Transport Agency
- Requirements are set out in New Zealand Standard [NZS 5433:2020](#), Transport of dangerous goods on land
  - SNZ HB 5433:2021UN dangerous goods list (published 28/01/22)
- Storage and handling of Hazardous Substances, including Dangerous Goods, is covered by [Health and Safety at Work \(Hazardous Substances\) Regulations 2017](#)
  - Administered by WorkSafe New Zealand
- Classification is based on Hazardous Substances & New Organisms (HSNO) Regs
- NZ has adopted GHS 7 from 30 April 2021 with a 4-year transition period

# National Legislation Cross-Reference

Location	Hazardous Substances / GHS	Dangerous Goods Storage & Handling	Dangerous Goods Transport
<a href="#">Commonwealth</a>	Work Health and Safety Regulation 2011	Work Health and Safety Regulation 2011	National Transport Commission (Road Transport Legislation – Dangerous Goods Act) Regulations 2006
<a href="#">ACT</a>	Work Health and Safety Regulation 2011	Work Health and Safety Regulation 2011	Dangerous Goods (Road Transport) Regulation 2010
<a href="#">NSW</a>	Work Health and Safety Regulation 2017	Work Health and Safety Regulation 2017	Dangerous Goods (Road and Rail Transport) Regulation 2014
<a href="#">NT</a>	Work Health and Safety (National Uniform Legislation) Regulations 2011	Work Health and Safety (National Uniform Legislation) Regulations 2011	Transport of Dangerous Goods By Road and Rail (National Uniform Legislation) Regulations 2011
<a href="#">QLD</a>	Work Health and Safety Regulation 2011	Work Health and Safety Regulation 2011	Transport Operations (Road Use Management—Dangerous Goods) Regulation 2018
<a href="#">SA</a>	Work Health and Safety Regulation 2012	Work Health and Safety Regulation 2012 Dangerous Substances (General) Regulations 2017	Dangerous Substances (Dangerous Goods Transport) Regulations 2008
<a href="#">TAS</a>	Work Health and Safety Regulation 2012	Work Health and Safety Regulation 2012	Dangerous Goods (Road and Rail Transport) Regulations 2010
<a href="#">VIC</a>	Occupational Health and Safety Regulations 2017	Dangerous Goods (Storage and Handling) Regulations 2012 (until 26 November 2022) Dangerous Goods (Storage and Handling) Regulations 2022 (from 26 November 2022)	Dangerous Goods (Transport by Road or Rail) Regulations 2018
<a href="#">WA</a>	Work Health and Safety (General) Regulations 2022	Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007	Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007
<a href="#">NZ</a>	Health and Safety at Work (Hazardous Substances) Regulations 2017	Health and Safety at Work (Hazardous Substances) Regulations 2017	Land Transport Rule: Dangerous Goods 2005

# Hazardous Substances



# Classification of Hazardous Substances

- A substance is deemed to be hazardous if it meets criteria specified in:
- Globally Harmonised System of Classification and Labelling of Chemicals 7<sup>th</sup> Revised Edition (GHS)
  - GHS 3<sup>rd</sup> Edition can no longer be used after 31/12/2022
  - Note: UNECE now up to 9<sup>th</sup> Revised Edition (2021)

# Globally Harmonised System of classification and labelling of chemicals (GHS)

- The GHS is an internationally recognised system for the classification of chemicals
  - Developed by United Nations Economic Commission for Europe (UNECE)
  - Derived from existing systems, e.g. USA, Canada, EU, UN Transport of Dangerous Goods (TDG), etc.
- Provides a harmonised system of hazard communication through labels and safety data sheets

# GHS classifies chemicals according to:

- Physical hazards
  - 9 classes, aligned to the dangerous goods classes
- Environmental hazards
  - Acute aquatic toxicity
  - Chronic aquatic toxicity
- Health hazards
  - Acute toxicity
  - Skin corrosion
  - Skin irritation
- Health hazards (cont.)
  - Serious eye damage
  - Eye irritation
  - Respiratory sensitizer
  - Skin sensitizer
  - Germ cell mutagenicity
  - Carcinogenicity
  - Reproductive toxicity
  - Specific target organ toxicity (STOT)
  - Aspiration hazard

# Identifying hazards of chemicals

- Section 2 of the SDS
- Identifies hazardous substance chemical by:
  - Pictograms (similar to DG diamonds)
  - Signal Word – “WARNING” or “DANGER”
  - Hazard and Precaution statements
    - (Replaced Risk and Safety Phrases)

# GHS Pictograms

- The GHS prescribes 9 pictograms to convey the hazards of chemicals



*Exploding bomb*  
**Explosives**



*Flame*  
**Flammables**



*Flame over circle*  
**Oxidisers**



*Gas cylinder*  
**Gases under pressure**



*Corrosion*  
**Corrosives**



*Skull and crossbones*  
**Acute toxicity**



*Environment*  
**Environmental hazard**



*Exclamation mark*  
**Harmful/irritant**  
**Harmful to ozone layer**



*Health hazard*  
**Severe health hazards**

- Two new symbols are introduced
- All relevant pictograms will appear on label (according to the prioritisation rules).
  - In practice more than 4 pictograms is very rare

# GHS Pictograms

- The GHS also allows dangerous goods class labels to be displayed on labelling and safety data sheets.
- There are no equivalents to the “exclamation mark” and “health hazard” pictograms.



1

2

3

4

5

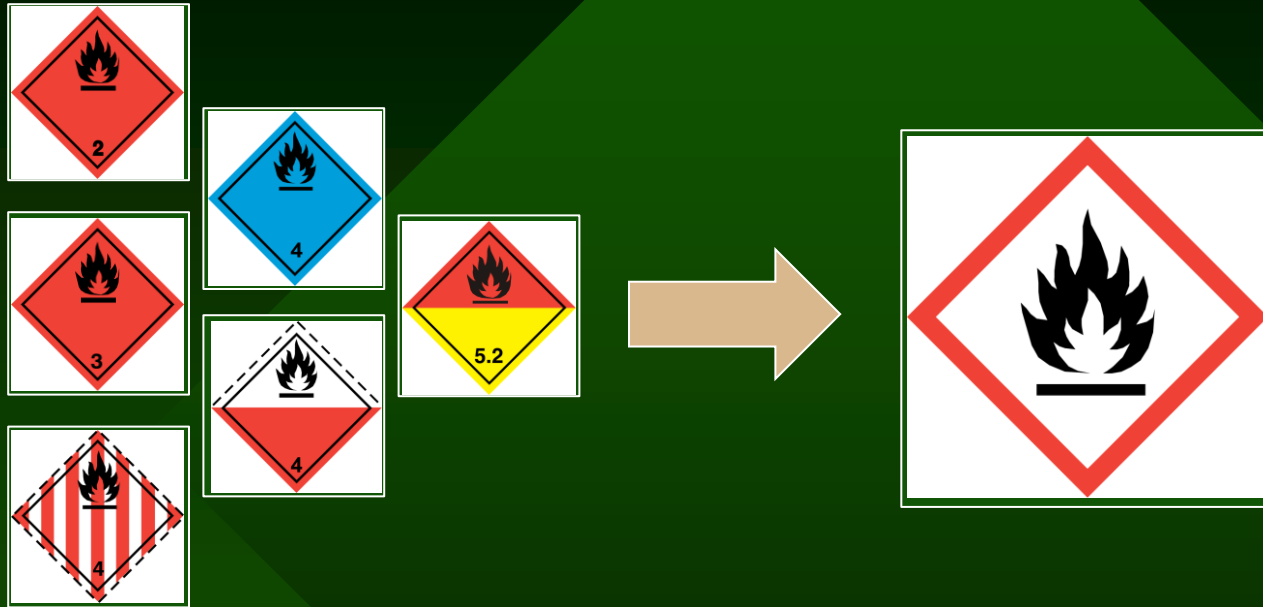
6

8

9

Dangerous Goods Class

# GHS Pictogram for Flammable chemicals



- 6 different “flammable” symbols become one – intrinsic hazard not always obvious at a glance.
  - Read label e.g. **In contact with water releases flammable gas**
  - **NO CHANGE TO PLACARDS** - DG symbol still required

# Hazard & Precaution Statements

- H followed by 3 numbers
- Physical hazards
  - H225 Highly flammable liquid and vapour
- Health Hazards
  - H302: Harmful if swallowed
  - H350: May cause cancer
- Enviro hazards
  - H410: Very toxic to aquatic life with long-lasting effects
- Country-specific (Australia)
  - AUH014: Reacts violently with water
- P followed by 3 numbers
- General
  - P102: Keep out of reach of children
- Prevention
  - P233: Keep container tightly closed
- Response
  - P372: Explosion risk in case of fire
- Storage
  - P420: Store away from other materials
- Disposal
  - P501: Dispose of contents/container to ...

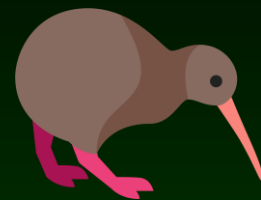


# Changes from GHS 3 to GHS 7 – Australia

- New hazard categories and classes for:
  - Non-flammable aerosols
  - Chemically unstable gases
  - Pyrophoric gases
  - Desensitised explosives
- Adoption of eye irritant category 2B
- Updated precautionary statements.
- See Safe Work Australia guidance:
  - [GHS 7 – transition](#) (including 15-minute [Youtube webinar](#))
  - [Changes to chemical classifications and labelling under GHS 7](#)



# Changes from HSNO to GHS 7 – New Zealand



- From 2001 EPA NZ classified substances based on Hazardous Substances & New Organisms (HSNO) legislation which broadly aligns to DGs and GHS,
- Since adoption of HSW Act 2015 and HSW (Hazardous Substances) Regs 2017, hazardous substances regulation is transitioning from EPA NZ to WorkSafe NZ
- NZ adopted GHS 7 on 30 April 2021 with a 4-year transition for existing substances to comply with updated labelling, safety data sheets and packaging notices..
- See : [New Zealand's hazard classification system](#) (EPA NZ)
  - [HSNO to GHS7 Correlation table \(PDF, 241KB\)](#)

# Safety Data Sheets (SDS)

- A **Safety Data Sheet** (SDS) is a technical bulletin containing detailed information about a hazardous substance.
  - Formerly known as a **Material** Safety Data Sheet (MSDS)
- An SDS must comply with VIC OHS Regulation 145
  - = WHS Regulations Part 7.1 Division 2
  - = NZ HSW (Hazardous Substances) Regulation 2.11
- The hazard identification for the substance must be determined in accordance with the GHS.

# Safety Data Sheet (Cont.)

- Is an advisory document
- Provides information on particular substances
- However, producer of document picks up responsibility for:
  - Completeness
  - Accuracy
- Duty of care

# Safety Data Sheet (Cont.)

- The manufacturer or importing supplier of a hazardous substance must ensure an SDS is prepared
- Manufacturer or supplier must ensure a copy is provided
  - on or before the first occasion that the substance is supplied to a person,
  - after the SDS is reviewed
  - to any employer who intends to use that hazardous substance in a workplace, on request.

# Should a Safety Data Sheet be less than 5 years old?

- YES!
- VIC OHS Reg 146 Review and revision of safety data sheet
  - A **manufacturer** or an **importing supplier** of a hazardous substance must ensure that the safety data sheet for a substance is reviewed—
    - a) as often as is necessary to ensure that the safety data sheet contains current and accurate information; and
    - b) **at least every 5 years.**
  - **AND**
- An **employer** must ensure that a **current** safety data sheet is available (Reg 155 and 156).
- WHS Reg 330:
  - (3) The manufacturer or importer of the hazardous chemical must:
    - (a) review the safety data sheet at least once every 5 years...

# 16 Header SDS – Sections

- Section 1 Identification of the material and supplier
- Section 2 Hazards identification
- Section 3 Composition/information on ingredients
- Section 4 First aid measures
- Section 5 Fire fighting measures

# 16 Header SDS – Sections *(Cont.)*

- Section 6 Accidental release measures
- Section 7 Handling and Storage
- Section 8 Exposure Control / Personal Protection
- Section 9 Physical and chemical properties
- Section 10 Stability and reactivity



# 16 Header SDS – Sections *(Cont.)*

- Section 11 Toxicological information
- Section 12 Ecological information
- Section 13 Disposal considerations
- Section 14 Transport information
- Section 15 Regulatory information
- Section 16 Other information



# SAFETY DATA SHEET

## SECTION 1 IDENTIFICATION: PRODUCT IDENTIFIER AND CHEMICAL IDENTITY

**Product Identifier** METHYLATED SPIRITS  
**Other Names** Ethanol, Ethyl Alcohol, IMS  
**Manufacturer's Product Code** 15000  
**Recommended Use** Solvent, Fuel, Cleaning Solvent

### Details of Supplier/Manufacturer

Company:	Recochem Inc.	ABN: 69 010 485 999
Address:	1809 Lytton Road, Lytton, Queensland 4178	
Phone:	(07) 3308 5200	Fax: (07) 3308 5201
Website:	www.recochem.com.au	

### Emergency Telephone Numbers

Business Hours:	(07) 3308 5200	
After Hours:	1300 131 001	
Poisons Information:	Australia: 13 11 26	New Zealand: 0800 764 766

## SECTION 2 HAZARDS IDENTIFICATION

<b>Hazardous chemical</b>	according to classification by Safe Work Australia
<b>Dangerous goods</b>	according to the Australian Code for the Transport of Dangerous Goods by Road and Rail

**Signal Word** DANGER

GHS Classification	Pictogram	Hazard statement
Flammable Liquids, Category 2		H225 Highly flammable liquid and vapour
Serious Eye Damage/Irritation, Category 2A		H319 Causes serious eye irritation

Product: METHYLATED SPIRITS

### Precautionary statements:

GENERAL	
P101	If medical advice is needed, have product container or label at hand
P102	Keep out of reach of children
P103	Read label before use
PREVENTATIVE	
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P233	Keep container tightly closed
P240	Ground/bond container and receiving equipment
P241	Use explosion-proof electrical/ventilation/lighting equipment
P242	Use only non-sparking tools
P243	Take precautionary measures against static discharge
P264	Wash thoroughly after handling
P280	Wear protective gloves/eye protection/face protection
RESPONSE	
P303 + P361 + P353	IF ON SKIN (or hair): Take off contaminated clothing and wash before reuse. Rinse skin with water/shower
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing
P337 + P313	If eye irritation persists: Get medical advice/attention
P370 + P378	In case of fire: Use foam/water spray/fog for extinction
STORAGE	
P403 + P235	Store in a well-ventilated place. Keep cool
DISPOSAL	
P501	Dispose of contents/container in accordance with local regulations

## SECTION 3 COMPOSITION AND INFORMATION ON INGREDIENTS

### Ingredients Names and Proportions

Chemical Entity	CAS Number	Proportion (%)
Ethanol	64-17-5	>= 95
Demin. Water	7732-18-5	<= 5

## SECTION 4 FIRST AID MEASURES

### Description of necessary first aid measures

Inhalation:	Remove victim from exposure if safe to do so. If rapid recovery does not occur, transport to nearest medical facility for additional treatment. Remove contaminated clothing.
Skin Contact:	If skin contact occurs, remove contaminated clothing and wash skin thoroughly with water and follow by washing with soap if available.
Eye Contact:	If in eyes, hold eyes open, flood with water for at least 15 minutes. If symptoms persist transport to nearest medical facility for additional treatment.
Ingestion:	If swallowed, do NOT induce vomiting. Transport to nearest medical facility for additional treatment.

### Symptoms caused by exposure

Inhalation:	May cause irritation to the respiratory system. Inhalation of the vapour may result in drunkenness (as per effects of ingestion). Early symptoms may occur at airborne levels of 1000 to 5000ppm.
Skin:	May include burning sensation and/or a dried/cracked appearance. Prolonged contact may cause defatting of skin which can lead to dermatitis.

# Safety Data Sheet Exercise



Adobe Acrobat  
Document

1. What is the issue date of the SDS?
2. What is the Product Name and name of the supplier?
  - Section 1
3. Is the material Hazardous? If yes, write down one (1) Hazard Statement.
  - Section 2
4. Is it a Dangerous Good? If so, what is the UN Number and Proper Shipping Name?
  - Section 14
5. Which section describes physical and chemical properties of the material? Write down two (2) of its physical or chemical properties.



**Safety Data Sheet**  
**Sodium Nitrate**  
**Revision 4, Date 26 Jun 2019**

**1. IDENTIFICATION**

<b>Product Name</b>	<b>Sodium Nitrate</b>
<b>Other Names</b>	Nitrate of Soda; Sodium Nitrate Prilled; Sodium Nitrate Technical
<b>Uses</b>	Catalyst; fertiliser; fluxing agent; oxidant; preservative; propellant.
<b>Chemical Family</b>	No Data Available
<b>Chemical Formula</b>	NaNO <sub>3</sub>
<b>Chemical Name</b>	Nitric acid, sodium salt
<b>Product Description</b>	No Data Available

**Contact Details of the Supplier of this Safety Data Sheet**

<b>Organisation</b>	<b>Location</b>	<b>Telephone</b>
Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000
Redox Pty Ltd	11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222
Redox Inc.	3960 Paramount Boulevard Suite 107 Lakewood CA 90712 USA	+1-424-675-3200

1. What is the issue date of the SDS?
2. What is the Product Name and name of the supplier?  
➤ Section 1



## Safety Data Sheet Sodium Nitrate Revision 4, Date 26 Jun 2019

### Hazard Classification

Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

### Hazard Categories

Oxidising Solids - Category 3

Serious Eye Damage/Irritation - Category 2A

### Pictograms



### Signal Word

Warning

### Hazard Statements

**H272**

May intensify fire; oxidizer.

**H319**

Causes serious eye irritation.

### Precautionary Statements

Prevention

**P210**

Keep away from heat.

**P221**

Take any precaution to avoid mixing with combustibles/organic material.

**P280**

Wear protective gloves/eye protection/face protection.

Response

**P370 + P378**

In case of fire: Use water for extinction.

**P337 + P313**

If eye irritation persists: Get medical advice/attention.

**P305 + P351 + P338**

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Disposal

**P501**

Dispose of contents/container in accordance with local / regional / national / international regulations.

3. Is the material Hazardous?  
If yes, write down one (1)  
Hazard Statement.  
➤ Section 2

#### 14. TRANSPORT INFORMATION

Land Transport (Australia)  
ADG Code

Proper Shipping Name	SODIUM NITRATE
Class	5.1 Oxidising Substances
Subsidiary Risk(s)	No Data Available
EPG	31 Oxidizing Substances
UN Number	1498
Hazchem	1Z
Pack Group	III
Special Provision	No Data Available

4. Is it a Dangerous Good? If so, what is the UN Number and Proper Shipping Name.  
➤ Section 14

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Physical State</b>	Solid
<b>Appearance</b>	Crystalline or prilled
<b>Odour</b>	Odourless
<b>Colour</b>	White
<b>pH</b>	8 - 10 (5% aqueous solution)
<b>Vapour Pressure</b>	Considered negligible (@ No Data Available)

5. Which section describes physical and chemical properties of the material? Write down two (2) of its physical or chemical properties.

Form 21047, Revision 3, Page 4 of 10, 13-Oct-2021 02:15:30

*Safety Data Sheet Sodium Nitrate Revision 4, Date 26 Jun 2019*

<b>Relative Vapour Density</b>	No Data Available
<b>Boiling Point</b>	No Data Available
<b>Melting Point</b>	306 - 307 °C
<b>Freezing Point</b>	No Data Available
<b>Solubility</b>	Soluble in water (88 g/100 ml)
<b>Specific Gravity</b>	2.26
<b>Flash Point</b>	No Data Available

# Safety Data Sheet Exercise

1. What is the issue date of the SDS?
  - 26 June 2019
2. What is the Product Name and name of the supplier?
  - Redox Sodium Nitrate
3. Is the material Hazardous? If yes, write down one (1) Hazard Statement.
  - Yes: H272 May intensify fire; oxidizer, H319 Causes serious eye irritation.



# Safety Data Sheet Exercise

4. Is it a Dangerous Good? If so, what is the UN Number and Proper Shipping Name?
  - UN Number 1498, Proper Shipping Name SODIUM NITRATE
5. Which section describes physical and chemical properties of the material? Write down two (2) of its physical or chemical properties.
  - Physical State Solid, Appearance Crystalline (powder), Odour Odourless, Colour White, etc.

# Hazardous Substances Register

- Legal requirement
  - VIC OHS Reg 162 and DG (S&H) Reg 60
  - WHS Regulation 346
- List of product names of all Hazardous Substances in the workplace, including Dangerous Goods and combustible liquids
- Accompanied by the current SDS
- Can (should!) be combined with Dangerous Goods Register

# DG & Hazardous Substance Register

Supplier	Product	Issue Date	Expiry Date	Eye Hazard	Skin Hazard	Inhalation	Ingestion	DG Class
BOC Gases	Argoshield Light	31/01/2020	31/01/2025	No	No	No	No	2.2 Non-Flammable Non-Toxic Gas
Bostik	PLUMBFIX KITCHEN & BATH NC TRANSPARENT	23/02/2021	23/02/2026	Yes	Yes	Yes	Yes	No
Bostik	Plumbweld Pipe Cement Type N	12/08/2016	12/08/2021	Yes	Yes	Yes	Yes	3 Flammable Liquid
Castrol	Spheerol EPL 2 Grease	16/01/2019	16/01/2024	No	No	No	No	No
Dulux	381-Line Super Enamel High Gloss	29/02/2016	28/02/2021	Yes	Yes	Yes	Yes	3 Flammable Liquid
Dymark	Spray & Mark	01/11/2019	01/11/2024	Yes	Yes	Yes	No	2.1 Flammable Gas
Dymark	Spray Ink	01/11/2019	01/11/2024	Yes	Yes	Yes	No	2.1 Flammable Gas
Agar	All Fresh Toilet and Bathroom Cleaner	01/07/2016	01/07/2021	Yes	Yes	No	Yes	No

# Dangerous Goods

# Recap: Hazardous Substances vs. Dangerous Goods

- Dangerous goods are classified based on immediate hazards during transport, storage and handling, e.g. explosion, fire, toxicity, corrosivity and radioactivity
- Hazardous substances are classified based on the risks they pose to people during short and long-term exposure
- While the categories overlap, they are not the same
- The categories are not static – they are changing progressively, in Australia and internationally

# ADG Code

- Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)
- Maintained by the National Transport Commission (NTC).
- Mainly intended for transport, but applies to manufacture and storage in relation to classification, labelling and packaging.

# ADG Code *(Cont...)*

- ADG7 replaced ADG6 in 2007, to align line with the UN Recommendations on the Transport of Dangerous Goods, 13<sup>th</sup> Edition (UN13).
- Current version: ADG7.7, based on UN21, adopted 1 October 2020; mandatory as of 1 October 2021
- ADG Code is reviewed 2-yearly based on UN Recommendations
- Draft ADG 7.8, based on UN22, was due to be adopted for use from 1 October 2022.
- It is still expected to be mandatory from 1 October 2023.

# Structure of the ADG Code

- The Code consists of:
  - 13 Parts
  - 4 Appendices



# Structure of the ADG Code *(Cont...)*

1. General Provisions, Definitions and Interpretation
2. Classification
3. Dangerous Goods Lists, Special Provisions and Limited Quantities Exceptions
4. Packing, Tank, Container, Vehicle and Equipment Provisions
5. Consignment Procedures – Including Labelling, Marking and Placarding
6. Requirements for the Construction and Testing of Packagings, IBCs, Large Packagings, Portable Tanks, MEGCs, Bulk Containers, Tank Vehicles, Freight Containers & Segregation Devices

# Structure of the ADG Code *(Cont...)*

7. Provisions Concerning Transport Operations
8. Stowage and Restraint
9. Segregation
10. Bulk Transfer of Dangerous Goods
11. Documentation
12. Safety Equipment for Road Vehicles
13. Procedures during Road Transport

# Structure of the ADG Code *(Cont...)*

Four Appendices:

- A. Goods too dangerous to be transported
- B. Forms
- C. Hazchem codes
- D. Code of practice for reprocessing steel drums

# Classification of Dangerous Goods

- CLASS
  - DIVISION
- SUBSIDIARY HAZARD
- PACKING GROUP
- UN NUMBER
- PROPER SHIPPING NAME

# DG Class, Division & Subsidiary Hazard

- CLASS means the Class of Dangerous Goods as shown in the ADG Code
- Within the Classes, there are DIVISIONS
- Substances can be classified within 2 or more Classes, with secondary Class(es) referred to as SUBSIDIARY HAZARDS

# Class 1: Explosives

## Some Explosive Articles

Ammunition	Flash Powder	Smokeless Powder	Sounding Devices
Black Powder	Fuse	Primer	Torpedoes
Bombs	Fuse (Ammo)	Projectiles	Warheads
Charges	Igniters	Propellants	
Fireworks	Mines	Rocket Motors	
Flares	Powder cake	Signals	



# Division 2.1 Flammable Gases

- Gases which ignite on contact with a source of ignition, however:
- They only ignite in a certain range of concentrations with air
- Above the upper limit – too rich to burn
- Below the lower limit – too lean to burn
- Heavier-than-air gas leaks may flow and accumulate in low points
  - e.g. propane, butane (LPG)



# Aerosols





# Division 2.2 Non-Flammable Non-Toxic Gases

- Not Flammable when exposed to a source of ignition
- Not Toxic, but can cause death by asphyxiation
- Most are heavier than air, many 6 or 7 times heavier
- Some are stored in cryogenic form, i.e. below minus 150°C
- Oxygen has sub-hazard 5.1



# Oxidising Gas

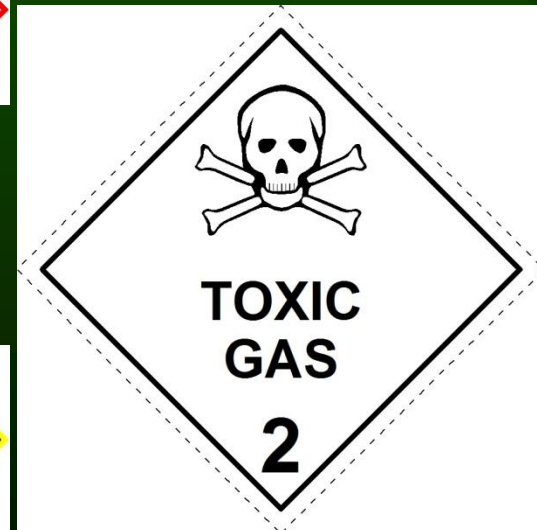
- Division 2.5
- This class diamond can be used for road and rail transport in Australia in place of class 2.2 and sub-hazard 5.1
- It is not used internationally and cannot be used for sea freight (IMDG)
- Examples:
  - Oxygen gas
  - Nitrous oxide



# Division 2.3 – Toxic Gas

Most toxic gases are heavier than air and many have a subsidiary hazard

- Ammonia, Anhydrous Sub-Hazard 8
- Arsine SH 2.1
- Bromine Chloride SH 5.1 & 8
- Chlorine SH 5.1 & 8



# Class 3: Flammable Liquids

- The UN defines a flammable liquid as:
  - Any liquid having a flash point not more than 60° C
- A C1 combustible liquid has a flash point above 60° C and below 93° C



# Class 4: Flammable Solids

Class 4 includes 3 Divisions with different diamonds:

- 4.1 Flammable solids
- 4.2 Spontaneously combustible
- 4.3 Dangerous when wet

# Division 4.1 Flammable Solids

- Can be easily ignited by flames, sparks etc and are readily combustible
- Danger may also come from toxic combustion products

Examples: sulphur  
red phosphorus  
magnesium  
matches  
firelighters



# Division 4.1 Flammable Solids

- Includes
  - Readily Combustible Solids
  - Desensitized Explosives
  - Self-Reactive Materials
    - Classified into Types A, B, C, D, E, F and G

# Division 4.2 - Spontaneously Combustible

Can burst into flames without an external source of ignition being applied

Two types:

1. **Pyrophoric materials**
2. **Self-heating materials**

Examples:

- White phosphorous (kept under water)
- Activated carbon
- Iron swarf





# Division 4.3 - Substances which in contact with water emit flammable gases

When they react with water, these substances are liable to become spontaneously flammable due to the heat liberated by the reaction.

## Examples:

- sodium (gives off hydrogen)
- calcium carbide (gives off acetylene)



# Division 5.1 – Oxidizing Agents

Not necessarily combustible but can liberate oxygen and therefore increase ferocity of a fire

## Examples:

- Sodium Nitrate
- Hydrogen Peroxide



# Division 5.2 – Organic Peroxides

Can react with organic materials to cause fire

Example:

- Epoxy adhesive hardener, MEKP (Methyl Ethyl Ketone Peroxide)



This DG Class Diamond is no longer used (discontinued as of 2011)



# Division 6.1 - Toxic Substances

Liable to cause death or serious injury or be harmful to health if swallowed, inhaled or by skin contact

## Examples:

- Sodium cyanide
- N,N-dimethylaniline
- Alkaloids, solid, N.O.S.
- Trichlorethylene
- Methylene chloride



# Division 6.2 Infectious Substances

An infectious substance is a viable microorganism or its toxin that causes or can cause disease in humans or animals.

Potentially infectious substances include:

- Blood and blood products
- Skin, tissue, cell cultures
- Pathogens  
–(viruses, bacteria, parasites, etc.)

This placard is used for transport but is not required for storage areas.



# Class 7: Radioactive Materials



Radioactive White-I, Yellow-II, and Yellow-III alerts emergency response workers to increasing radioactivity.

White-I is the least radioactive and Yellow-III is the most radioactive.

# Class 8 - Corrosives

A corrosive material is **either** of the following:

1. Liquid or solid that causes visible destruction or irreversible alterations in skin tissue at the site of contact.
2. Liquid that has a severe corrosion rate on steel or aluminum, as measured in accordance with certain prescribed UN testing procedures.

Examples:

- Solids      sodium hydroxide pellets
- Liquids     hydrochloric acid



# Class 8 - Corrosives

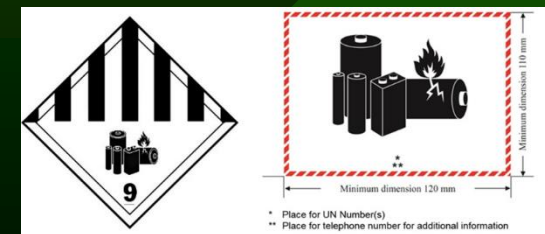
Most corrosives are either **Acidic** or **Alkaline**

- **Acids – pH LESS THAN 7**
  - Hydrochloric
  - Sulphuric
- **Alkalis – pH GREATER THAN 7**
  - Sodium hydroxide
  - Potassium hydroxide
- Class 8 Acids and Alkalis must be **segregated**
  - Check pH in the SDS: SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES



# Class 9: Miscellaneous Hazardous Materials

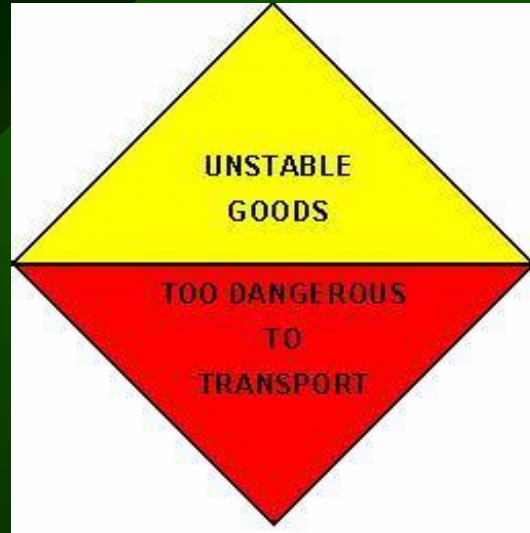
- Materials that present a hazard during transportation but not included in any other hazard class.
- Examples
  - materials with anesthetic or noxious properties
  - elevated-temperature substances – e.g. hot bitumen
  - hazardous wastes
  - marine pollutants
  - magnetized materials,
  - lithium batteries (risk of fire if damaged)



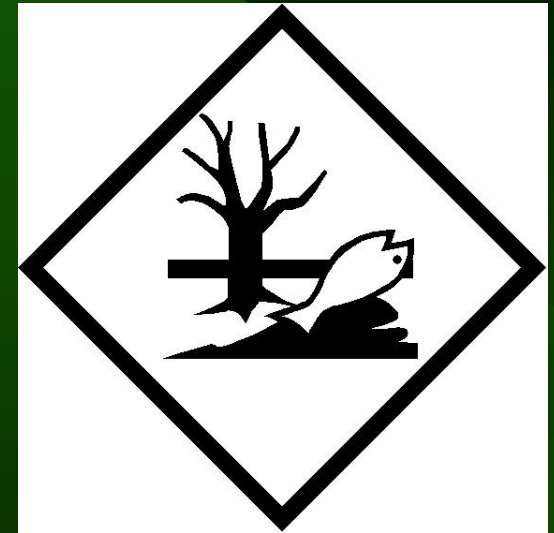
# Other Dangerous Goods Diamonds



Multi Class diamond  
– used for transport



Goods too  
dangerous to be  
transported



Environmentally  
Hazardous mark

# Subsidiary Hazard

- A secondary hazard (or risk) that meets the UN criteria
- e.g. Hydrogen peroxide
  - Class 5.1
  - Subsidiary hazard 8



# Packing Group

- Packing Group I
    - Great Danger
  - Packing Group II
    - Medium Danger
  - Packing Group III
    - Minor Danger
- Used for packing purposes, to classify common DGs
  - NOT used for explosives, gases, radioactives, organic peroxides, infectious substances and some class 4 substances

# DG Packing Group vs. GHS Category

- GHS refers to “Categories” which are aligned to DG Packing Groups
  - e.g. DG Class 3 Flammable Liquids

DG PG	GHS Category	Criteria	Hazard Statement
I	1	Flash point < 23°C and initial boiling point ≤ 35°C	H224 Extremely flammable liquid and vapour
II	2	Flash point < 23°C and initial boiling point >35°C	H225 Highly flammable liquid and vapour
III	3	Flash point ≥ 23°C and ≤ 60°C	H226 Flammable liquid and vapour
	4	Flash point > 60°C and ≤ 93°C	H227 Combustible liquid

# UN Number

- Internationally recognized 4-digit number – mainly used in transport.
- Maybe specific to a chemical, or generic to a class – e.g.
  - UN 1114 BENZENE
  - UN 1950 AEROSOLS
  - UN 2921 CORROSIVE SOLID, FLAMMABLE, N.O.S. (*Not Otherwise Specified*)
  - UN 3480 LITHIUM ION BATTERIES (including lithium ion polymer batteries)

# Proper Shipping Name

2790 ACETIC ACID SOLUTION more than 10% but not less than 80% acid by mass

The proper shipping name is the part of the description shown in upper case

# Special Classifications

- Materials transported at or above their flash point are classified as flammable liquids
  - UN 3256 ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.
    - Example is hot bitumen
- Liquids transported above 100°C, and solids transported above 240°C are Class 9
  - UN 3257 ELEVATED TEMPERATURE LIQUID, N.O.S.
  - UN 3258 ELEVATED TEMPERATURE SOLID, N.O.S.





**ELEVATED TEMPERATURE  
LIQUID FLAMMABLE**

UN No.

**3256**

HAZCHEM

**2Y**



**IN EMERGENCY, DIAL  
000, POLICE OR FIRE  
BRIGADE**

**SPECIALIST ADVICE**

**131 700**

# Fire Risk Dangerous Goods

- Goods which burn readily or support combustion
- Classes 2.1, 3, 4 or 5, or products with a 2.1, 3, 4 or 5 sub-hazard

# SUSMP (Poisons Schedule)

Standard for the Uniform Scheduling of Medicines and Poisons

Schedule	Description
Schedule 2.	Pharmacy Medicine
Schedule 3.	Pharmacist Only Medicine
Schedule 4.	Prescription Only Medicine, or Prescription Animal Remedy
Schedule 5.	<b>Caution</b>
Schedule 6.	<b>Poison</b>
Schedule 7.	<b>Dangerous Poison</b>
Schedule 8.	Controlled Drug
Schedule 9.	Prohibited Substance
Schedule 10	Substances of such danger to health as to warrant prohibition of sale, supply and use

A Health Department Poisons License may be required to manufacture, store, supply or use certain Schedule 7 poisons

# Packaging

- Dangerous Goods for transport must be in approved packaging.
  - Prescribed packaging (e.g. Gas cylinders)
  - Packaging that has a requirement to pass a testing standard (e.g. Steel drum)

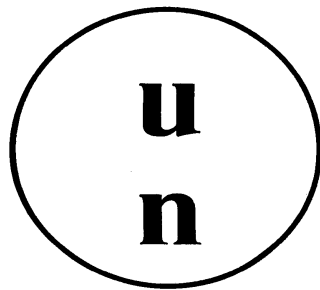
# Prescribed Packaging

Particular forms of packaging are prescribed for some classes of Dangerous Goods

- Class 2            Gases
- Division 4.1      Self-reactive substances only
- Division 5.2      Organic Peroxides

# Approved Package Marking

## PLASTIC FILM BAG



**5H4/Y25/S/89**  
**AUS/3008**

- UN marking to certify package conforms to Australian Code and therefore internationally acceptable
- Plastics Film Bag
- Okay for Dangerous Goods Groups II and III
- Allowable maximum gross mass of package
- Solids to be carried in bag
- Year of manufacture
- Competent Authority approval number or packaging manufacturer Code
- Country authorising bag specifications

# Other Information

ADG includes a large amount of specific detail about packaging and transport – e.g.

P010	PACKING INSTRUCTION (LIQUIDS)		P010	
The following packagings are authorised provided that the general provisions of 4.1.1 and 4.1.3 are met:				
Combination packagings				
Inner packagings	Outer packagings	Maximum net mass (see 4.1.3.3)		
Glass 1 L Metal 40 L	<b>Drums</b>		<b>142</b>	
	steel (1A1, 1A2)	400 kg		
	plastics (1H1, 1H2)	400 kg		
	plywood (1D)	400 kg		
		fibre (1G)	400 kg	<b>144</b>
	<b>Boxes</b>			
	steel (4A)	400 kg		
	natural wood (4C1, 4C2)	400 kg		
	plywood (4D)	400 kg		
	reconstituted wood (4F)	400 kg		
	fibreboard (4G)	400 kg		
	expanded plastics (4H1)	60 kg		
	solid plastics (4H2)	400 kg		
Single packagings		Maximum capacity (see 4.1.3.3)		
<b>Drums</b>	steel, non-removable head (1A1)	450 L	<b>387</b>	
<b>Jerricans</b>	steel, non-removable head (3A1)	60 L		
<b>Composite packagings</b>	Plastics receptacle in steel drums (6HA1)	250 L		
<b>Steel pressure receptacles</b> , provided that the general provisions of 4.1.3.6 are met.				

Solvent extracted soya bean meal containing not more than 1.5% oil and 11% moisture, which is substantially free of flammable solvent, is not subject to this Code.

An aqueous solution containing not more than 24% alcohol by volume is not subject to this Code.

Lithium batteries in conformity with 2.9.4 (f) containing both primary lithium metal cells and rechargeable lithium ion cells shall be assigned to UN Nos. 3090 or 3091 as appropriate. When such batteries are transported in accordance with special provision 188, the total lithium content of all lithium metal cells contained in the battery shall not exceed 1.5 g and the total capacity of all lithium ion cells contained in the battery shall not exceed 10 Wh.

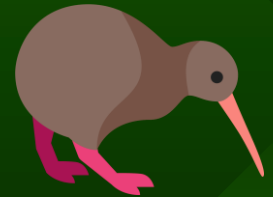
# URL - additional information

- Australian Dangerous Goods Code (ADG )
  - <http://www.ntc.gov.au/heavy-vehicles/safety/australian-dangerous-goods-code/>
- Safe Work Australia
  - [www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au)
- Dangerous Goods (Storage and Handling) Regulations 2012 (VIC)
  - [www.legislation.vic.gov.au/](http://www.legislation.vic.gov.au/)
- UN Model Regulations for the Transport of Dangerous Goods
  - <https://unece.org/info/publications/pub/364867>
- Global Harmonisation System (GHS) – UNECE
  - [https://www.unece.org/trans/danger/publi/ghs/ghs\\_welcome\\_e.html](https://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html)
- Labelling of Agricultural and Veterinary chemicals
  - <https://apvma.gov.au/registrations-and-permits/labelling-codes>
- Poisons Schedule (SUSMP)
  - <https://www.tga.gov.au/publication/poisons-standard-susmp>



# URL - additional information

- EPA NZ – Hazardous substances classification
  - <https://www.epa.govt.nz/industry-areas/hazardous-substances/new-zealands-new-hazard-classification-system/>
- WorkSafe New Zealand – Hazardous Substances
  - <https://www.worksafe.govt.nz/topic-and-industry/hazardous-substances/>
- Hazardous Substances Toolbox
  - <https://www.hazardoussubstances.govt.nz/>
- NZ Land Transport Agency
  - <https://nzta.govt.nz/resources/rules/dangerous-goods-2005-index/>
- NZ Health and Safety at Work (Hazardous Substances) Regulations
  - <https://www.legislation.govt.nz/>



# Australian & New Zealand Standards

- AS 1940–2017 The storage and handling of flammable and combustible liquids
- AS/NZS 2243.10:2004 Safety in laboratories—Storage of chemicals
- AS 3780–2008 The storage and handling of corrosive substances
- AS/NZS 3833:2007 The storage and handling of mixed classes of dangerous goods, in packages and intermediate bulk containers
- AS 4332–2004 (R2016) The storage and handling of gases in cylinders
- AS/NZS 4452:1997 The storage and handling of toxic substances
- AS/NZS 4681:2000 The storage and handling of Class 9 (miscellaneous) dangerous goods and articles
- AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods
- NZS 5433:2020 Transport of dangerous goods on land
- SNZ HB 5433:2021 UN dangerous goods list

# Sources of information

- Physical inspection
- Internal and external audits
- Employee knowledge and expertise
- Trade journals
- WorkCover alerts and publications
- Incident /injury records
- Industry associations

# Sources of information (Cont...)

- Product information
- Technical data sheets
- Manufacturers instruction manuals
- Personal contacts
- By asking 'What if?'
- Brainstorming



# **AEBN SERIES 1: Dangerous Goods, Hazardous Substances and GHS Workshop Webinar**

**26 October 2022**

Presented by

**Australian Environment Business Network (AEBN)**

National Office

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