Safety Data Sheet

GHS Hazardous Chemical. Not Dangerous Goods.

Lime Sulphur Fungicide / Insecticide

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

IDENTIFICATION

Product Names:	**Lime Sulfur Fungicide / Insecticide**
Other Names:	Calcium Polysulfide
Product Code(s):	**250mL, 500 mL, 5L, 20L, 200L**
USE:	For control of certain diseases, insects and mites on pome fruit, stone fruit, citrus, grapes, roses, hedges, vegetables and tomatoes as per the directions for use on the label.
Mode of Action:	Fungicide which acts directly and also by decomposition to elemental sulfur, which acts as a protective fungicide. As an insecticide it acts by softening the wax of scale insects.
COMPANY DETAILS:	Kendon Chemical & MNFG. Co. Pty Ltd A.B.N. 27 004 281 967 8-10 Abbot Street Fairfield, Victoria 3078 Phone: 03 9497 2822 Fax: 03 9499 7225
Emergency Telephone No:	**Business Hrs** **03 9497 2822** **After Hrs** **0418-530-461 (General Manager)** **0409-577-174 (Technical Manager)**

2. HAZARD IDENTIFICATION

Emergency Overview: Clear red liquid with a strong, unpleasant smell of Hydrogen Sulfide (H_2S). Irritating to eyes, respiratory system and skin. Contact with acids liberates toxic H_2S gas. Harmful to aquatic life.

Dangerous Goods Information: Not Dangerous Goods by Road & Rail, nor by Air, nor by Sea.

GHS Hazardous Chemical Information:
Classified as a Hazardous Chemical to the Australian GHS Criteria.

Signal Word: **WARNING**

Classification:

Skin Corrosion / Irritation	- Hazard Category 2
Eye Damage / Irritation	- Hazard Category 2A
STOT Single Exposure (Respiratory Irritation)	- Hazard Category 3
Acute Toxicity – Oral	- Hazard Category 4

Hazard Statements:
Harmful if swallowed
Causes skin irritation.
Causes serious eye irritation.
May cause respiratory irritation.
Contact with acids liberates toxic gas.
Harmful to aquatic life.

Precautionary Statements

- Prevention
Wear protective gloves, eye protection / face protection.
Avoid breathing vapours / mist / spray.
Use only outdoors or in a well-ventilated area.
Wash hands thoroughly after handling.

- Response	IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor/if you feel unwell. IF SWALLOWED: Call a POISON CENTER/doctor/if you feel unwell. Take off contaminated clothing and wash before reuse.
- Storage	Store locked up, in a well-ventilated place. Keep container tightly closed.
- Disposal	Dispose of contents / container in accordance with the Local, State & Federal EPA waste regulations.
SUSMP Poison	Not Applicable

Acute Health Effects

Swallowed	Harmful if swallowed. May irritate the mouth and throat due the presence of Sulfide Ion. Ingestion may cause stomach pains and flatulence. Has a mild laxative effect. Decomposition to toxic Hydrogen Sulfide gas (H_2S) occurs in the digestive tract. Signs & symptoms of H_2S toxicity may include: headache, nausea, vomiting, drowsiness, amnesia, tremors, depressed respiration, cyanosis and death due to paralysis.
Eye	Causes serious eye irritation.
Skin	Causes skin irritation. May cause an allergic skin reaction in already sensitised persons.
Inhaled	Will cause respiratory irritation from inhalation of spray mists. Will irritate mucous membranes of nose and mouth. May cause catarrhal inflammation of the nose causing excessive running secretions from the nose.

Chronic Health Effects

Continued poor handling practice will cause skin irritation and dermatitis.

3. COMPOSITION / INFORMATION ON INGREDIENTS

SUBSTANCE NAME	Proportion #	CAS Number
Calcium Polysulfide Sulfur (CaS_x) *	20% w/v	1344-81-6
Calcium Monosulfide (CaS)	<10% w/v	20548-54-3
Free Sulfur (S)	<10% w/v	7704-34-9
Calcium Thiosulfate (CaS_2O_3)	<10% w/v	10124-41-1
Total Soluble Sulfur	10-30% w/v	
Inert Ingredients	<10% w/v	
Water	remainder	7732-18-5

* typically this is mainly CaS_5 and CaS_6

4. FIRST AID MEASURES

Swallowed:	Wash out mouth with water. Do NOT induce vomiting. Give plenty of water to drink. Keep patient at rest and seek medical advice; or contact the Poisons Information Centre ph: 131-126.
Eyes:	Hold eyes open and wash with running water. Ensure irrigation under eyelids by occasionally lifting them. Seek medical attention.
Skin:	Wash the skin with soap and water. Remove contaminated clothing and footwear. Ensure contaminated clothing is thoroughly washed before using again.

Inhaled:	Remove to fresh air. Keep at rest until fully recovered. Seek medical attention. If not breathing, apply artificial respiration, but only under medical supervision.
First-Aid Facilities:	Eye wash and safety shower, plus normal washroom facilities nearby.
Advice to Doctor:	Treat symptomatically. Swallowing Calcium Polysulfide causes direct caustic injury to the upper gastrointestinal tract, coma and severe metabolic acidosis. No specific antidote known. Probable mucosal damage may contraindicate gastric lavage. Trachiobronchitis is a frequent occurrence, with dyspnea, persistent cough and expectoration, which may be sometimes streaked with blood. *Metabolism in the Body:* With the body, H_2S is metabolized by Oxidation, Methylation, and Reaction with Metallo- or Disulfide-containing proteins. In the bloodstream the gas is converted to alkali sulfide. The Hydrosulfide radical is excreted by the lungs and in urine. Part of the Sulfide is Oxidized to Sulfate and Thiosulfate. *Mechanisms of Action in the Body:* Hydrosulfide anion (HS^-) forms a complex with Methemoglobin known as Sulfmethemoglobin, which is analogous to Cyanmethemoglobin. Despite lower binding affinity for Sulfide, induced Methemoglobinemia provides unequivocal protection against death from acute Sulfide poisoning in animals.

5. FIRE-FIGHTING MEASURES

Fire or Explosion Hazard:	Does not burn as this product contains >50% water. However, IF the Water has evaporated, the dried residue of Lime Sulphur is combustible and can burn.
Extinguishing Media:	Water spray; Water fog; Carbon dioxide; Dry Chemical; Foam, according to the surrounding materials.
Combustion Product Hazards:	Oxides of Sulphur (SOx).
Special Protective Precautions & Equipment:	Move containers from the fire area if it can be done without risk. Bund the fire area to prevent contamination of water sources.

6. ACCIDENTAL RELEASE MEASURES

Accidental Release Measures:	Wear overalls, gloves and safety glasses with side shields. Avoid contact with skin and eyes. Contain spill. Prevent liquid from entering waterways or sewers. Collect recoverable product into labelled containers for use or recycling. If necessary use absorbent material such as sand or vermiculite and shovel up into labelled containers. After spill cleanup, wash any residues in the area with a detergent solution and rinse with water, preventing run off from entering drains. Do NOT use acidic materials to clean up the spill area. Very small spills may be washed away with excess water. Larger spills must be contained and recovered. Inform the Local Authorities if gross contamination of waterways is threatened. See Section 13 for Disposal Considerations
Special Issues:	Will act as a fungicide/insecticide and may cause localised problems for beneficial organisms. Selectively toxic to mites:

7. HANDLING AND STORAGE

Handling:

Keep containers closed at all times when being handled. Do NOT mix the product with acidic water as this releases Very Toxic Hydrogen Sulphide gas. Do NOT contaminate streams, rivers or waterways with this chemical or unclean containers.

Mixer/Loader/Applicator: Primary concerns relate to irritation of eyes, skin, mucous membranes, and lungs; Hydrogen Sulfide gas: well ventilated preparation/treatment areas and proper protective equipment have a low H_2S hazard expected.

Storage:

Store in a dry, well ventilated area, out of direct sunlight. Store away from oxidising agents. Store in closed, original containers, out of direct sunlight. Keep away from food, drink and animal feeds. Keep out of reach of children.

Store and handle in accordance with Work Health & Safety Regulations or Occupational Health & Safety Regulations; and
AS 2507-1998 The Storage and Handling of Agricultural and Veterinary Chemicals.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

National Exposure Standards:

No specific Exposure Standard have been determined by Safe Work Australia.

Hazardous Decomposition Products:

Hydrogen Sulfide	10 ppm 14 mg/m3 TWA	15 ppm 21 mg/m3 STEL
Sulfur Dioxide	2 ppm 5.2 mg/m3 TWA	5 ppm 13 mg/m3 STEL

Design and Engineering Control Measures:

When mixing - Use good general ventilation.
Consider local exhaust extraction where Hydrogen Sulfide fumes may be formed.

Personal Protective Equipment:

Avoid skin, eye and inhalation contact.
When handling the concentrated product the following personal protective equipment should be used:
Wear PVC or rubber elbow length gloves.
Wear safety glasses with side shields, face shield or goggles as needed.
Wear coveralls and long sleeves to minimise accidental skin contact.
Wear a PVC or natural rubber apron (or a splash suit if required).

Always wash hands before smoking, eating, drinking or using the toilet.
After each days use, wash gloves and face shield or goggles and contaminated clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form	Liquid
Appearance and Odour	Clear red liquid with a strong, unpleasant smell of Hydrogen Sulfide.
Chemical Formula (for the main ingredients)	CaSx (x is typically 5 & 6); CaS; CaS_20_3; S; H_2O
Melting Point / Boiling Point	MP <10°C (estimated) BP 100°C (approx)
Vapour Pressure	As for Water
Specific Gravity	1.25 at 20°C
Relative Vapour Density	Not available (air=1)
Solubility	Miscible in water.
Percent volatile by volume	>50% (water content)

pH	10.5-11.5 (undiluted)
Odour Threshold	Not available
Saturated Vapour Conc'n	Not available
Evaporation Rate	Not available (Butyl Acetate = 1)
Octanol/Water Partition Co-efficient	log P(o/w) Not available
Corrosiveness	Will slowly corrode Aluminium, Copper, Zinc, etc, due to its alkaline nature.

Flammable Properties

Flashpoint	Not applicable (water based solution)
Flammability Limits (FL) (%)	Lower FL: Not applicable Upper FL: Not applicable
Autoignition Temp	Not applicable

10. STABILITY AND REACTIVITY

Chemical Stability:	Stable.
Conditions To Avoid:	Extreme heat and fire.
Incompatible Materials:	Acids; Strong Oxidising agents. Reacts with heavy metal ions to form insoluble precipitates.
Unsuitable Container Materials:	Aluminium, Copper, Zinc and their alloys.
Hazardous Decomposition Products:	Contact with Acid: Will release very toxic Hydrogen Sulphide gas. If Burnt: Will form Oxides of Sulphur (SOx)
Hazardous Reactions:	Acidic solutions release very toxic Hydrogen Sulphide gas. Hazardous polymerisation will not occur.

11. TOXICOLOGICAL INFORMATION

Overall Product: Irritating to eyes, respiratory system and skin. Harmful if swallowed.
Sufficient Hydrogen Sulphide may be released by Acid in the digestive system to cause toxic effects and possibly death by paralysis. May cause an allergic skin reaction in already sensitised persons.

Calcium Polysulfide (as 100% w/w):

Acute Oral Toxicity TDL_o (man):	891 mg/kg	(TDL_o - Toxic Dose Lowest Value)
Acute Oral Toxicity LDL_o (woman):	562 mg/kg	(LDL_o - Lethal Dose Lowest Value)
Eye Irritation (rabbit):	Causes eye irritation	[ECHA RSD and C&LID]
Skin Irritation (rabbit):	Causes skin Irritation	[ECHA RSD and C&LID]
Respiratory Irritation:	Causes respiratory irritation	[ECHA RSD and C&LID]

A bathing agent containing Calcium Polysulphides was administered orally to rats, and then Polysulphides and Sulphide (the decomposed product of Polysulphides), were analyzed. The concentrations of Polysulphides (mumol/ml or g) were found to be highest in blood (0.196), followed by the liver (0.051), the lungs (0.018) and kidneys (0.013), but were below the detection limit (0.005 mumol/g) in the other tissues tested. Sulfide was detected in all the tissue samples and was found to be highest in the blood (0.518 mumol/ml), this being 40 times higher than that required for fatal poisoning in the case of Hydrogen Sulfide. Polysulphide poisoning was considered to be confirmatively diagnosed by detecting and measuring Polysulphides and supplementary Sulphide in body tissues, most pertinently in the blood. [from HSDB].

Calcium Sulfide (as 100% w/w):

Acute Oral Toxicity – Oral	Toxic if swallowed	[SWA HCIS]
Eye Irritation:	Causes eye irritation	[ECHA C&LID]
Skin Irritation:	Causes skin Irritation	[ECHA C&LID]
Respiratory Irritation:	Causes respiratory irritation	[ECHA C&LID]

Sulfur (as 100% w/w):

Acute Oral Toxicity LD50 (rat):	>5000 mg/kg
Acute Dermal Toxicity LD50 (rat):	>5000 mg/kg
Acute Inhal'n Toxicity LC50 (rat):	>9.23 mg/L/4hrs

Eye Irritation (rabbit):	Not irritating	
Skin Irritation (rabbit):	Causes skin irritation	[ECHA RSD]
Sensitisation (guinea pig)	Not sensitising	

Acute - May be irritating to eyes and mucous membranes.

Chronic – Sulphur containing products have been used for many years as fungicides in agriculture without any reported adverse health effects. Sulfur has been shown to be non-mutagenic in micro-organisms.

Hydrogen Sulfide (decomposition product when acidified)
This is released in small amounts from the product.
Hydrogen Sulfide will be released in large amounts after contact with acid. Take care when mixing.

Man: lethal at 600 ppm/30 min; lethal immediately at 800 ppm
Man: severe toxic effects 200 ppm (280 mg/cu m) 1 min; symptoms of illness 50 ppm (70 mg/cu m)

Acute Inhal'n Toxicity LC50 (rat):	444 ppm
Acute Inhal'n Toxicity LC50 (mouse):	634 ppm

Eye Irritation (rabbit):	Vapours cause irritation. In general, irritation of the eyes occurs at a concentration of H2S of 50 ppm

Acute – Corrosive to skin, eyes and mucous membranes.

Chronic – There are no published reports of carcinogenesis, mutagenesis, or teratogenesis attributable to Hydrogen Sulfide exposure.

12. ECOLOGICAL INFORMATION

General: Spillage of the whole container in one location may cause a localised environmental hazard due its Fungicidal and Insecticidal effects. Selectively toxic to mites. Toxic to Fungi and Insects. Low hazard to bees. Low toxicity to birds.

Harmful to aquatic life. Water polluting substance. Do not contaminate streams, rivers or waterways with the product or used containers.

Ecotoxicity Data: **Calcium Polysulphide & Calcium Sulfide (as 100%):**

Classified by ECHA RSD and C&L Database as H400 and on the HCIS as Very toxic to aquatic life. However this classification is NOT supported by the available Ecotoxicity Data for Lime-Sulfur (see below), so they are classified as "Toxic to Aquatic Life" as 100%.

Acute Fish Aquatic Toxicity: LC50 (Bluegill, 96hrs):	49 mg/L
Acute Fish Aquatic Toxicity: LC50 (Rainbow Trout, 96hrs):	3-8 mg/L
Acute Fish Aquatic Toxicity: LC50 (Fathead Minnow, 96hrs):	32 mg/L
Acute Algae Aquatic Toxicity: EC50 (Green Algae, 5 days):	14 mg/L
Acute Water Flea Aquatic Toxicity: EC50 (Daphnia Pulex, 48hrs):	10 mg/L

[Acute Aquatic Toxicity Data from: http://www.pesticideinfo.org for Lime-Sulfur]

Acute Bird Oral Toxicity: LC50 (Bobwhite Quail): > 5000 ppm

Sulphur (as 100%):

Acute Fish Aquatic Toxicity: LC50 (*Oncorhynchus Mykiss, 96hrs):*	>100 mg/L
Acute Fish Aquatic Toxicity: LC50 (Danio Rerio*, 96hrs):*	866 mg/L
Acute Aquatic Toxicity LC50 (*Daphnia Magna,* 48 hrs):	>1000 mg/L.
Acute Aquatic Toxicity EC50 (Algae):	> 100 mg/L
Acute Bacterial Toxicity EC50 (Activated Sludge, 3hrs):	1900 mg/L
Acute ProtozoaToxicity EC50 (Tetrahymen Pyriformis, 24hrs):	0.16 mg/L
Acute Bird Oral Toxicity: LC50 (Bobwhite Quail, 8 days):	> 5000 ppm.

Persistence & Degradability Rapid degradation on soil/vegetation leaving a Sulfur residue, may burn plant leaves: negligible hazards from residues spread by animals; slight acute hazards from improper cleaning or inadequate disposal.

13. DISPOSAL CONSIDERATIONS

Disposal: Disposal to be in accordance with Local, State & Federal EPA waste regulations. Advise its irritant, very toxic gas released under Acid conditions, and harmful to aquatic life hazardous nature. Recover and reuse the product if possible.
Send for treatment by removal of the Sulphur, or reaction or incineration at an EPA approved facility.

Empty Containers: Unclean containers must be handled as hazardous waste until cleaned. Do not burn uncleaned empty containers. Empty contaminated packages thoroughly, then triple rinse the container adding the rinsate to the spray tank or dispose of to an approved facility. Containers can be recycled after cleaning.

14. TRANSPORT INFORMATION

Not classified as Dangerous Goods according to the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code); or by air according to the IACO (IATA Regulations), or by sea according to the IMO (IMDG Code).

UN Number:	Not applicable
Proper Shipping Name:	Not Applicable
Dangerous Goods Class:	Not Applicable
Subsidiary risk:	Not applicable
Packing Group:	Not Applicable
Hazchem Code:	Not Applicable

Dangerous Goods - Initial Emergency Response Guide (SAA/SNZ HB76): Not Applicable
Marine Pollutant to IMDG Code: No

15. REGULATORY INFORMATION

GHS Hazardous Chemical Information:
Classified as a Hazardous Chemical to the Australian GHS Criteria.

Signal Word: **WARNING**

Classification:

Skin Corrosion / Irritation	- Hazard Category 2
Eye Damage / Irritation	- Hazard Category 2A
STOT Single Exposure (Respiratory Irritation)	- Hazard Category 3
Acute Toxicity – Oral	- Hazard Category 4

Hazard Statements:
H315 - Causes skin irritation.
H319 - Causes serious eye irritation.
H335 - May cause respiratory irritation.
H302 - Harmful if swallowed.
AUH031 - Contact with acids liberates toxic gas.
H402 - Harmful to aquatic life.

Precautionary Statements

- Prevention
P280 - Wear protective gloves, eye protection / face protection.
P261 - Avoid breathing mist / spray.
P271 - Use only outdoors or in a well-ventilated area.
P264 - Wash hands thoroughly after handling.

- Response
P302+352 - IF ON SKIN: Wash with plenty of soap and water.
P332+313 - If skin irritation occurs: Get medical advice/attention.
P305+351+338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+313 - If eye irritation persists: Get medical advice/attention.
P304+340+312 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor/if you feel unwell.
P301+312 - IF SWALLOWED: Call a POISON CENTER/doctor/if you feel unwell.
P362+364 - Take off contaminated clothing and wash before reuse.

- Storage
P405+403+233 - Store locked up, in a well-ventilated place.
Keep container tightly closed.

- Disposal
P501 - Dispose of contents / container in accordance with the Local, State & Federal EPA waste regulations

Classified as Hazardous: due to the combined Calcium Polysulfide & Calcium Sulfide content.

SUSMP Schedule Poison: Not Scheduled

APVMA: Approval No.53131/0700

16. OTHER INFORMATION

SDS Dates and Revisions

SDS Original Preparation Dates	:	June 2000, Feb 2006, 19 May 2010, 25 June 2014, 17 Feb 2016
SDS Latest Revision Date	:	15th January 2021
Sections Changed in Latest Revision	:	Sections changed: 2, 8, 9, 10, 11, 12, 13, 15, 16. Added “Harmful if swallowed” due to release of H_2S in the stomach.

Contact Point: phone: (03) 9497 2822 email: CStory@Kendon.com.au
mobile:0418-530-461 (General Manager) mobile: 0409-577-174 (Technical Manager)

SDS APPROVED: Kendon

Acronyms Used

ADG Code	Australian Dangerous Goods Code for the Transport of Dangerous Goods by Road & Rail
Safe Work Australia	Safe Work Australia (SWA) (since April 2009) administers ASCC & NOHSC documents.
HCIS	Hazardous Chemicals Information System at: http://hcis.safeworkaustralia.gov.au/
NZ EPA HSNO CCID	Environmental Risk Management Authority New Zealand, HSNO Chemical Classification Information Database. https://www.epa.govt.nz/database-search/chemical-classification-and-information-database-ccid/

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e-ChemPortal	Global Portal to Information on Chemical Substances https://www.echemportal.org/echemportal/substance-search
ECHA	European Chemicals Agency at http://echa.europa.eu/
ECHA C&LID	ECHA Classification & Labelling Inventory Database (& CLP where applicable) http://echa.europa.eu/information-on-chemicals/cl-inventory-database
AICIS	Australian Industrial Chemicals Introduction Scheme www.industrialchemicals.gov.au/
WHS Regs	Work Health & Safety Regulations (in various States and Territories in Australia)
CAS No.	Chemical Abstracts Service Registry Number
UN No.	United Nations Dangerous Goods Number
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons

SDS Code Used	This SDS has been prepared according to the Australian SWA Code of Practice for the Preparation of Safety Data Sheets for Hazardous Chemicals August 2020 (116 page pdf) www.safeworkaustralia.gov.au/doc/model-code-practice-preparation-safety-data-sheets-hazardous-chemicals

This SDS summarises to the best of our knowledge the health and safety hazard information on the product and how to safely handle and use the product in the workplace, and should not be construed as guaranteeing specific technical properties. Each user should read this SDS and consider the information in the context of how the product will be handled and used in the workplace, including in conjunction with other products. If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact this company. Since methods and conditions are beyond our control, in inappropriate contexts we do not accept liability for any damages resulting from the use of, or reliance on, this information.

Reviewers Initials / Yr / Mth: JS2101