

SODIUM SULPHIDE FLAKES (FUSED)

GHS Safety Data Sheet

Version No:2.0

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

SODIUM SULPHIDE FLAKES (FUSED)

OTHER NAMES

$\text{Na}_2\text{S} \cdot 3\text{H}_2\text{O}$, $\text{Na}_2\text{S} \cdot 5\text{H}_2\text{O}$, $\text{Na}_2\text{S} \cdot x\text{H}_2\text{O}$, $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$, "sulfide of soda sulphide of soda", "sodium sulphide sulfide nonahydrate hydrated with at least 30% water", "sodium monosulphide", "disodium sulphide", "disodium monosulfide trihydrate"

PROPER SHIPPING NAME

SODIUM SULPHIDE, HYDRATED

PRODUCT USE

Used as an analytical organic chemical; in dyes, dehairing hides, sheep dip; general chemical for gold, lead and copper ore treatment; photographic reagent; cotton printing, viscose rayon; engraving and lithography.

SUPPLIER

Company: S D FINE- CHEM LIMITED

Address:

315- 317, T.V. INDUSTRIAL ESTATE,
248, WORLI,
MUMBAI- 400030.INDIA.

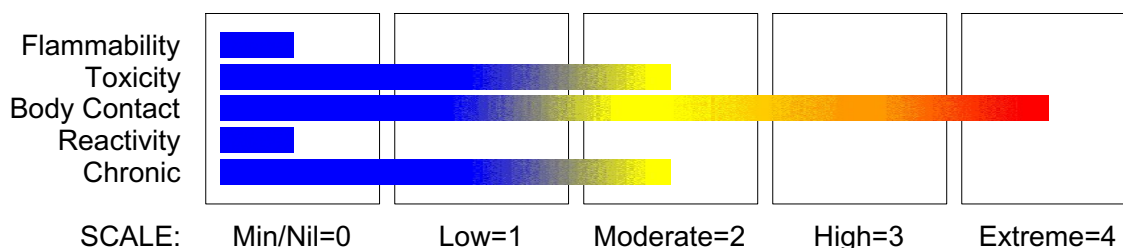
technical@sdfine.com

Telephone: 91- 22- 24959898

Telephone: 91- 22- 24959899

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HAZARD RATINGS



Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Aquatic Hazard Category 1

Metal Corrosion Category 1

continued...

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Section 2 - HAZARDS IDENTIFICATION

Skin Corrosion/Irritation Category 1B
Skin Sensitizer Category 1



EMERGENCY OVERVIEW

HAZARD

DANGER

Determined by using GHS criteria:

H317 H290 H314 H400

May cause allergic skin reaction

May be corrosive to metals

Causes severe skin burns and eye damage

Very toxic to aquatic life

PRECAUTIONARY STATEMENTS

Prevention

Keep only in original container.

Do not breathe dust/fume/gas/mist/vapours/spray.

Avoid breathing dust/fume/gas/mist/vapours/spray.

Wash thoroughly after handling.

Contaminated work clothing should not be allowed out of the workplace.

Avoid release to the environment.

Wear protective gloves/protective clothing/eye protection/face protection.

Response

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

IF ON SKIN: Wash with plenty of soap and water.

IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.

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

Immediately call a POISON CENTER or doctor/physician.

If skin irritation or rash occurs: Get medical advice/attention.

Wash contaminated clothing before reuse.

Absorb spillage to prevent material damage.

Collect spillage.

Storage

Store locked up.

Store in corrosive resistant container or with a resistant inner liner.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME

sodium sulfide, hydrated

(hydrated with >30% water of crystallization)

NOTE: Readily decomposed by heat, acids to produce

CAS RN

1313-84-4

%

>98

continued...

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Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

hydrogen sulfide	7783-06-4
Contact with air produces	
sodium thiosulfate	7772-98-7
sodium carbonate	497-19-8

Section 4 - FIRST AID MEASURES

SWALLOWED

- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.

EYE

If this product comes in contact with the eyes:

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs:

- Immediately flush body and clothes with large amounts of water, using safety shower if available.
- Quickly remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.
- Transport to hospital, or doctor.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

For acute or short-term repeated exposures to highly alkaline materials:

- Respiratory stress is uncommon but present occasionally because of soft tissue edema.
- Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary.
- Oxygen is given as indicated.
- The presence of shock suggests perforation and mandates an intravenous line and fluid administration.

continued...

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Section 4 - FIRST AID MEASURES

• Damage due to alkaline corrosives occurs by liquefaction necrosis whereby the saponification of fats and solubilisation of proteins allow deep penetration into the tissue.

Alkalis continue to cause damage after exposure.

INGESTION:

• Milk and water are the preferred diluents

No more than 2 glasses of water should be given to an adult.

• Neutralising agents should never be given since exothermic heat reaction may compound injury.

* Catharsis and emesis are absolutely contra-indicated.

* Activated charcoal does not absorb alkali.

* Gastric lavage should not be used.

Supportive care involves the following:

• Withhold oral feedings initially.

• If endoscopy confirms transmucosal injury start steroids only within the first 48 hours.

• Carefully evaluate the amount of tissue necrosis before assessing the need for surgical intervention.

• Patients should be instructed to seek medical attention whenever they develop difficulty in swallowing (dysphagia).

SKIN AND EYE:

• Injury should be irrigated for 20-30 minutes. Eye injuries require saline. [Ellenhorn & Barceloux: Medical Toxicology].

For exposures involving sulfides and hydrogen sulfide (including gastric acid decomposition products of alkaline sulfides):

• Hydrogen sulfide anion produces its major toxic effect through inhibition of cytochrome oxidases.

• Symptoms include profuse salivation, nausea, vomiting and diarrhea. Central nervous effects may include giddiness, headache, vertigo, amnesia, confusion and unconsciousness. Tachypnoea, palpitations, tachycardia, arrhythmia, sweating, weakness and muscle cramps may also indicate overexposure.

Treatment involves:

• If respirations are depressed, application of artificial respiration, administration of oxygen (continue after spontaneous breathing is established).

• For severe poisonings administer amyl nitrite and sodium nitrite (as for cyanide poisoning) but omit sodium thiosulfate injection.

• Atropine sulfate (0.6 mg intramuscularly) may contribute symptomatic relief.

• Conjunctivitis may be relieved by installation of 1 drop of olive-oil in each eye and sometimes by 3 drops of epinephrine solution (1:1000) at frequent intervals. Occasionally local anesthetics and hot and cold compresses are necessary to control pain.

• Antibiotics at first hint of pulmonary infection. [Gosselin et al, Clinical Toxicology of Commercial Products]

Hydrogen sulfide is metabolised by oxidation to sulfate, methylation and reaction with metallic ion- or disulfide containing proteins (principally cytochrome c oxidase). This latter reaction is associated with aerobic, cellular respiration and is largely responsible for the toxic effects.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

• Water spray or fog.

• Foam.

• Dry chemical powder.

• BCF (where regulations permit).

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Section 5 - FIRE FIGHTING MEASURES

- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding area.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD

- Non combustible.
 - Not considered a significant fire risk, however containers may burn.
- Decomposition may produce toxic fumes of: hydrogen sulfide (H₂S), metal oxides.
May emit corrosive fumes.

FIRE INCOMPATIBILITY

None known.

Personal Protective Equipment

Gas tight chemical resistant suit.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact by using protective equipment.
- Use dry clean up procedures and avoid generating dust.
- Place in a suitable labelled container for waste disposal.

MAJOR SPILLS

- DO NOT touch the spill material.
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Neutralise/decontaminate residue.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

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Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- DO NOT use aluminium, galvanised or tin-plated containers.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

- Lined metal can, lined metal pail/ can.
- Plastic pail.
- Polyliner drum.
- Packing as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

For low viscosity materials

- Drums and jerricans must be of the non-removable head type.
 - Where a can is to be used as an inner package, the can must have a screwed enclosure.
- For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):

- Removable head packaging;
 - Cans with friction closures and
 - low pressure tubes and cartridges
- may be used.

-Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

STORAGE INCOMPATIBILITY

- Contact with acids produces toxic fumes.
- Avoid contact with copper, aluminium and their alloys.
- Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.
- These trifluorides are hypergolic oxidisers. They ignites on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.
- The state of subdivision may affect the results.
- Sulfides are incompatible with acids, diazo and azo compounds, halocarbons, isocyanates, aldehydes, alkali metals, nitrides, hydrides, and other strong reducing agents.
- Many reactions of sulfides with these materials generate heat and in many cases hydrogen gas.

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Section 7 - HANDLING AND STORAGE

• Many sulfide compounds may liberate hydrogen sulfide upon reaction with an acid. Reacts slowly with moisture to give off toxic, flammable hydrogen sulfide. Reacts explosively with diazonium salts and dichloromethylamine

STORAGE REQUIREMENTS

- Store in original containers.
 - Keep containers securely sealed.
 - Store in a cool, dry, well-ventilated area.
 - Store away from incompatible materials and foodstuff containers.
 - Protect containers against physical damage and check regularly for leaks.
 - Observe manufacturer's storing and handling recommendations.
 - DO NOT store near acids, or oxidising agents.
- No smoking, naked lights, heat or ignition sources.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+: May be stored together

O: May be stored together with specific preventions

X: Must not be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- sodium sulfide, hydrated: CAS:1313- 84- 4 CAS:1313- 83- 3 CAS:27610- 45- 3
CAS:1313- 82- 2
- hydrogen sulfide: CAS:7783- 06- 4
- sodium thiosulfate: CAS:7772- 98- 7
- sodium carbonate: CAS:497- 19- 8

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
sodium sulfide, hydrated	250	
hydrogen sulfide		100

ODOUR SAFETY FACTOR (OSF)

OSF=1.2E3 (sodium sulfide, hydrated)

MATERIAL DATA

Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV

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STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life.

However this system is being replaced to be consistent with the European Union (EU) Scientific Committee on Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace. At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum. NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

None assigned. Refer to individual constituents.

Exposed individuals are reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odour Safety Factor (OSF) is determined to fall into either Class A or B.

The Odour Safety Factor (OSF) is defined as:

$$\text{OSF} = \frac{\text{Exposure Standard (TWA) ppm}}{\text{Odour Threshold Value (OTV) ppm}}$$

Classification into classes follows:

Class	OSF	Description
A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV- TWA for example) is being reached, even when distracted by working activities
B	26- 550	As " A" for 50- 90% of persons being distracted
C	1- 26	As " A" for less than 50% of persons being distracted
D	0.18- 1	10- 50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	As " D" for less than 10% of persons aware of being tested

Odour threshold for hydrogen sulfide is low and gives some exposure warning; however concentrations above >100ppm cause odour paralysis with loss of all hazard warning and may be fatal.

INGREDIENT DATA

HYDROGEN SULFIDE:

SODIUM CARBONATE:

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OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus

increasing the risk of overexposure.

HYDROGEN SULFIDE:

Hydrogen sulfide (H₂S):

- is a highly flammable and reactive gas
- reacts violently with strong oxidisers, metal oxides, metal dusts and powders,

bromine pentafluoride, chlorine trifluoride, chromium trioxide, chromyl chloride, dichlorine oxide, nitrogen trichloride, nitryl hypofluorite, oxygen difluoride, perchloryl fluoride, phospham, phosphorus persulfide, silver fulminate, soda-lime, sodium peroxide

- is incompatible with acetaldehyde, chlorine monoxide, chromic acid, chromic anhydride, copper, nitric acid, phenyldiazonium chloride, sodium
- forms explosive material with benzenediazonium salts
- attacks many metals

Flow or agitation of hydrogen sulfide may generate electrostatic charges due to low conductivity.

Odour Threshold Value for hydrogen sulfide: 0.0011 ppm (detection), 0.0045 ppm (recognition)

NOTE: Detector tubes for hydrogen sulfide, measuring in excess of 0.5 ppm are available commercially.

The TLV-TWA is protective against sudden death, eye irritation, neurasthenic symptoms such as fatigue, headache, dizziness, and irritability, or permanent central nervous system effects that may result from acute, subchronic, or acute exposure to hydrogen sulfide. The offensive odour of hydrogen sulfide does not give a reliable warning signal because olfactory fatigue occurs at concentrations of 150 to 200 ppm.

Hydrogen sulfide is probably the leading cause of sudden death in the workplace. Lethal hydrogen sulfide toxicity following inhalation of 1000-2000 ppm paralyses the respiratory centre and causes breathing to stop. At concentrations between 500 to 1000 ppm, the carotid bodies are stimulated causing hypernea which is followed by apnea. Low concentrations

(50-1500 ppm) produce eye and respiratory tract irritation. Prolonged exposure to concentrations of the order of 250-500 ppm may produce pulmonary oedema although 50 ppm has also reportedly produced this effect.

Concentrations in excess of 50 ppm produce acute conjunctivitis with pain, lachrymation and photophobia. These acute changes may progress to keratoconjunctivitis and vesiculation of the corneal epithelium.

Concentrations between 5 and 30 ppm produce ocular toxicity.

Odour Safety Factor(OSF)

OSF=1.2E3 (HYDROGEN SULFIDE).

May act as a simple asphyxiants; these are gases which, when present in high concentrations, reduce the oxygen content in air below that required to support breathing, consciousness and life; loss of consciousness, with death by suffocation may rapidly occur in an oxygen deficient atmosphere.

CARE: Most simple asphyxiants are odourless or possess low odour and there is no warning on entry into an oxygen deficient atmosphere. If there is any doubt, oxygen

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content can be checked simply and quickly. It may not be appropriate to only recommend an exposure standard for simple asphyxiants rather it is essential that sufficient oxygen be maintained. Air normally has 21 percent oxygen by volume, with 18 percent regarded as minimum under normal atmospheric pressure to maintain consciousness / life. At pressures significantly higher or lower than normal atmospheric pressure, expert guidance should be sought.

SODIUM CARBONATE:

It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace. At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum. NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

OEL STEL: (Russia) 5 mg/m³

PERSONAL PROTECTION



EYE

- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET

- Elbow length PVC gloves.

NOTE:

- The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.

Suitability and durability of glove type is dependent on usage. Factors such as:

- frequency and duration of contact,
 - chemical resistance of glove material,
 - glove thickness and
 - dexterity,
- are important in the selection of gloves.

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

OTHER

- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.

RESPIRATOR

Protection Factor	Half- Face Respirator	Full- Face Respirator	Powered Air Respirator
10 x ES	P1 Air- line*	- -	PAPR- P1 -
50 x ES	Air- line**	P2	PAPR- P2
100 x ES	-	P3	-
		Air- line*	-
100+ x ES	-	Air- line**	PAPR- P3

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations.

Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:

solvent, vapours, degreasing etc., evaporating from tank (in still air).
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).

Air Speed:

0.25- 0.5 m/s (50- 100 f/min.)

0.5- 1 m/s (100- 200 f/min.)

1- 2.5 m/s (200- 500 f/min.)

2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only.
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening

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of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

White to pink flakes; slight hydrogen sulfide (rotten egg) odour. Has greater than 30 % water of crystallisation, comprise principally the trihydrate, but also the pentahydrate and nonahydrate. Higher hydrates discolour on exposure to light and air; changing from yellow brown to brownish black. Higher hydrates melt readily as they are essentially solid solutions.

Solid sodium sulfide in contact with air exothermically oxidises to sodium carbonate, sodium thiosulfate and hydrogen sulfide.

Releases low levels of hydrogen sulfide (H₂S) at room temperature.

Mildly corrosive to most metals.

REACTIVE: mixing with acids etc. results in rapid release of toxic and flammable H₂S gas.

PHYSICAL PROPERTIES

Solid.

Mixes with water.

Corrosive.

Alkaline.

Contact with acids liberates toxic gas.

Molecular Weight: 132.08 (3H₂O)

Melting Range (°C): apprx 50- 90

Solubility in water (g/L): Miscible

pH (1% solution): 13

Volatile Component (%vol): Not applicable

Relative Vapour Density (air=1): Not applicable

Lower Explosive Limit (%): 4.3 (H₂S)

Autoignition Temp (°C): Not available.

State: Divided solid

Boiling Range (°C): Not applicable.

Specific Gravity (water=1): 1.43(9H₂O) 1.7

pH (as supplied): Not applicable

Vapour Pressure (kPa): 100 @ 145- 175 C

Evaporation Rate: Not applicable

Flash Point (°C): Not applicable

Upper Explosive Limit (%): 45.0 (H₂S)

Decomposition Temp (°C): Not available.

Viscosity: Not Applicable

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

For incompatible materials - refer to Section 7 - Handling and Storage.

continued...

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Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

Ingestion of alkaline corrosives may produce immediate pain, and circumoral burns. Mucous membrane corrosive damage is characterised by a white appearance and soapy feel; this may then become brown, oedematous and ulcerated. Profuse salivation with an inability to swallow or speak may also result. Even where there is limited or no evidence of chemical burns, both the oesophagus and stomach may experience a burning pain; vomiting and diarrhoea may follow. The vomitus may be thick and may be slimy (mucous) and may eventually contain blood and shreds of mucosa. Epiglottal oedema may result in respiratory distress and asphyxia. Marked hypotension is symptomatic of shock; a weak and rapid pulse, shallow respiration and clammy skin may also be evident. Circulatory collapse may occur and, if uncorrected, may produce renal failure. Severe exposures may result in oesophageal or gastric perforation accompanied by mediastinitis, substernal pain, peritonitis, abdominal rigidity and fever. Although oesophageal, gastric or pyloric stricture may be evident initially, these may occur after weeks or even months and years. Death may be quick and results from asphyxia, circulatory collapse or aspiration of even minute amounts. Death may also be delayed as a result of perforation, pneumonia or the effects of stricture formation.

Accidental ingestion of the material may be damaging to the health of the individual.

Ingestion of sulfide salts may result in their decomposition by stomach gastric acid to hydrogen sulfide with systemic poisoning. Symptoms may include headache, respiratory depression, cyanosis, fall of blood pressure, loss of consciousness, tremors and convulsions.

EYE

The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.

When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation.

Direct contact with alkaline corrosives may produce pain and burns. Oedema, destruction of the epithelium, corneal opacification and iritis may occur. In less severe cases these symptoms tend to resolve. In severe injuries the full extent of the damage may not be immediately apparent with late complications comprising a persistent oedema, vascularisation and corneal scarring, permanent opacity, staphyloma, cataract, symblepharon and loss of sight.

SKIN

The material can produce chemical burns following direct contact with the skin.

The material can produce severe chemical burns following direct contact with the skin.

Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.

Skin contact with alkaline corrosives may produce severe pain and burns; brownish stains may develop. The corroded area may be soft, gelatinous and necrotic; tissue destruction may be deep.

Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

SODIUM SULPHIDE FLAKES (FUSED)

Section 11 - TOXICOLOGICAL INFORMATION

INHALED

Inhalation may produce health damage*.

Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.

Inhalation of alkaline corrosives may produce irritation of the respiratory tract with coughing, choking, pain and mucous membrane damage. Pulmonary oedema may develop in more severe cases; this may be immediate or in most cases following a latent period of 5-72 hours. Symptoms may include a tightness in the chest, dyspnoea, frothy sputum, cyanosis and dizziness. Findings may include hypotension, a weak and rapid pulse and moist rales. Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.

Symptoms of hydrogen sulfide (H₂S) exposure may include profuse salivation, nausea, vomiting, diarrhoea, giddiness, headache, vertigo, amnesia, palpitations, arrhythmia, weakness, muscle cramps, confusion, sudden collapse, unconsciousness and death due to respiratory paralysis (above 300 ppm). Inhalation of (H₂S) at low concentrations causes headache, dizziness and upset stomach. Higher concentrations cause olfactory fatigue, irritation to the respiratory tract, excitement, confusion, and exposure for a prolonged period may cause bronchitis and pulmonary oedema.

Although hydrogen sulfide is extremely odourous, the "rotten egg" odour is not a reliable indicator for warning of exposure since odour fatigue readily occurs. Odour sensation is lost immediately at concentrations exceeding 200 ppm. Case reports suggest that toxic amounts can enter the body through a punctured ear drum, even while wearing some sorts of respiratory protection.

Hydrogen sulfide is primarily a respiratory toxin which inhibits the cytochrome-oxidase system and is probably more potent than hydrogen cyanide. The lifetime of hydrogen sulfide in oxygenated blood is short and sulfmethaemoglobin is rapidly detoxified by red blood cells and the liver. Most fatalities due to hydrogen sulfide intoxication occur at the scene of exposure and immediate supportive care is imperative. Ensure such contingencies are addressed as part of the site emergency plan and that operators or other employees who may become accidentally exposed, are made aware of the existence of such a plan.

CHRONIC HEALTH EFFECTS

Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Gastrointestinal disturbances may also occur. Chronic exposures may result in dermatitis and/or conjunctivitis.

Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

There exists limited evidence that shows that skin contact with the material is capable either of inducing a sensitisation reaction in a significant number of individuals, and/or of producing positive response in experimental animals.

Chronic low level exposures to hydrogen sulfide may produce headache, fatigue, dizziness, irritability and loss of libido. These symptoms may also result from damage produced by isolated or repeated unmeasured peak high level exposures in healthy persons or those suffering from pre-existing neurological diseases. A study on long term effects showed that H₂S apparently can cause continuing, sometimes unrecognised olfactory deficits. [Hirsch, A.R. - Occ. Env. Med., 1999, Vol 5, Iss 4, pp 284-287].

Long term exposure to high dust concentrations may cause changes in lung function (i.e.

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pneumoconiosis) caused by particles less than 0.5 micron penetrating and remaining in the lung. A prime symptom is breathlessness. Lung shadows show on X-ray.

TOXICITY AND IRRITATION

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

Intraperitoneal (Mouse) LD50: 53 mg/kg

Oral (Rat) LD50: 208 mg/kg *

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may produce respiratory tract irritation. Symptoms of pulmonary irritation may include coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and a burning sensation. Unlike most organs, the lung can respond to a chemical insult or a chemical agent, by first removing or neutralising the irritant and then repairing the damage (inflammation of the lungs may be a consequence). The repair process (which initially developed to protect mammalian lungs from foreign matter and antigens) may, however, cause further damage to the lungs (fibrosis for example) when activated by hazardous chemicals. Often, this results in an impairment of gas exchange, the primary function of the lungs. Therefore prolonged exposure to respiratory irritants may cause sustained breathing difficulties.

The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

* anhydrous form

IRRITATION

HYDROGEN SULFIDE:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

Inhalation (human) LDLo: 5.7 mg/kg

Inhalation (human) LCLo: 600 ppm/30m

Inhalation (human) LCLo: 800 ppm/5m

IRRITATION

Nil Reported

SODIUM THIOSULFATE:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

Oral (human) TDLo: 300 mg/kg/7d

IRRITATION

Nil Reported

[Hach]

SODIUM CARBONATE:

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

Oral (rat) LD50: 4090 mg/kg

Inhalation (rat) LC50: 2300 mg/m³/2h

IRRITATION

Skin (rabbit): 500 mg/24h Mild

Eye (rabbit): 100 mg/24h Moderate

continued...

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Section 11 - TOXICOLOGICAL INFORMATION

Eye (rabbit): 100 mg/30s Mild

Eye (rabbit): 50 mg SEVERE

The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

Section 12 - ECOLOGICAL INFORMATION

Very toxic to aquatic organisms.

This material and its container must be disposed of as hazardous waste.

Avoid release to the environment.

Refer to special instructions/ safety data sheets.

Section 13 - DISPOSAL CONSIDERATIONS

- Containers may still present a chemical hazard/ danger when empty.

- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.

- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction,

- Reuse

- Recycling

- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

- DO NOT allow wash water from cleaning or process equipment to enter drains.

- It may be necessary to collect all wash water for treatment before disposal.

- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.

- Where in doubt contact the responsible authority.

- Recycle wherever possible or consult manufacturer for recycling options.

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Section 13 - DISPOSAL CONSIDERATIONS

- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.
- Recycle containers if possible, or dispose of in an authorised landfill.

WASTE DISPOSAL PROCEDURES

- Collect and package recoverable quantities of sodium sulfide in a labelled container for recycling or disposal in accordance with local regulations. For each 10mL of commercial sodium sulfide solution add 100mL of 1% aqueous sodium hydroxide solution and 175mL of household bleach. Allow the solution to stand overnight, then empty into the drain [Armour 1996].

SPILLAGE DISPOSAL

- Wear nitrile rubber gloves, protective clothing and eye protection to control personal contact from aqueous solutions of sodium sulfide. Self contained breathing apparatus may be needed if hydrogen sulfide gas forms. Cover and contain the spill with a 1:1:1 mixture by weight of sodium carbonate or calcium carbonate, bentonite and sand. Scoop all of the absorbed mixture into a container and transfer to a well ventilated area. Add enough 1% aqueous sodium hydroxide solution to dissolve the sodium carbonate and to ensure the liquid is basic. For each 10mL of commercial sodium sulfide solution add 175mL of household chlorine bleach containing 5.25% sodium hypochlorite. Allow to stand overnight in a fume hood. Empty the liquid portion into the drain. Discard of the solid portions with normal refuse [Armour 1996].

Section 14 - TRANSPORTATION INFORMATION



Labels Required: CORROSIVE
HAZCHEM: 2X

UNDG:

Dangerous Goods Class:	8	Subrisk:	None
UN Number:	1849	Packing Group:	II
Shipping Name: SODIUM SULPHIDE, HYDRATED with not less than 30% water			

Air Transport IATA:

ICAO/IATA Class:	8	ICAO/IATA Subrisk:	None
UN/ID Number:	1849	Packing Group:	II
Special provisions:	None		
Shipping Name: SODIUM SULPHIDE, HYDRATED WITH 30% OR MORE WATER †			

Maritime Transport IMDG:

IMDG Class:	8	IMDG Subrisk:	None
UN Number:	1849	Packing Group:	II
EMS Number:	F- A, S- B	Special provisions:	None
Limited Quantities:	1 kg		
Shipping Name: SODIUM SULPHIDE, HYDRATED with not less than 30% water			

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Section 14 - TRANSPORTATION INFORMATION

Section 15 - REGULATORY INFORMATION

REGULATIONS

sodium sulfide, hydrated (CAS: 1313-84-4) is found on the following regulatory lists;
GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships
IMO IBC Code Chapter 17: Summary of minimum requirements
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
International Air Transport Association (IATA) Dangerous Goods Regulations
International Council of Chemical Associations (ICCA) - High Production Volume List
OECD Representative List of High Production Volume (HPV) Chemicals
The Australia Group Export Control List: Chemical Weapons Precursors
WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water

sodium sulfide, hydrated (CAS: 27610-45-3) is found on the following regulatory lists;
GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships
IMO IBC Code Chapter 17: Summary of minimum requirements
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
International Air Transport Association (IATA) Dangerous Goods Regulations
International Council of Chemical Associations (ICCA) - High Production Volume List
OECD Representative List of High Production Volume (HPV) Chemicals
The Australia Group Export Control List: Chemical Weapons Precursors
WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water

No data available for sodium sulfide, hydrated as CAS: 1313-83-3.

Section 16 - OTHER INFORMATION

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
sodium sulfide, hydrated	1313- 84- 4, 1313- 83- 3, 27610- 45- 3

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation determine the suitability of the information for their particular purpose.

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