POTASSIUM CYANIDE

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
POTASSIUM CYANIDE

OTHER NAMES

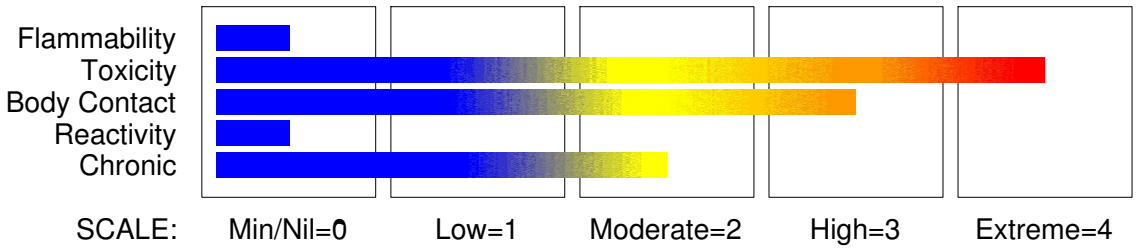
C-N-K, C-N-K, C-K-N, K-C-N, "cyanide of potassium", "hydrocyanic acid, potassium salt"

PROPER SHIPPING NAME
POTASSIUM CYANIDE, SOLID

PRODUCT USE
Extraction of gold and silver from ores; electroplating baths;
insecticide; fumigant for fruit trees, ships, warehouses, railway cars; case
hardening of steels; analytical chemistry; manufacture of other cyanides.
MUST NOT BE USED AS A PESTICIDE

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
Fax: 91- 22- 24937232

HAZARD RATINGS



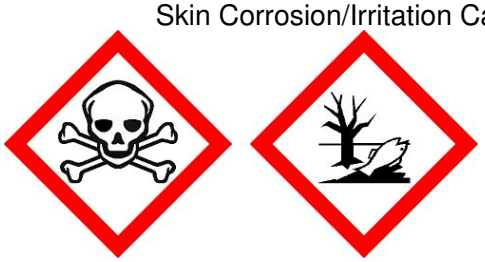
Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Toxicity (Dermal) Category 1
Acute Toxicity (Inhalation) Category 2

continued...

Acute Toxicity (Oral) Category 1
Chronic Aquatic Hazard Category 1
Skin Corrosion/Irritation Category 3



EMERGENCY OVERVIEW

HAZARD

DANGER
Determined by using GHS criteria:
H310 H300 H330 H316 H410
Fatal in contact with skin
Fatal if swallowed
Fatal if inhaled
Causes mild skin irritation
Very toxic to aquatic life with long lasting effects
Harmful to life in the soil

PRECAUTIONARY STATEMENTS

Prevention

Wear protective gloves/clothing
Do not get in eyes, on skin or on clothing
Do not breathe dust/fume/gas/mist/vapours/spray.
Wear respiratory protection.
Use only outdoors or in a well ventilated area.
Wash hands thoroughly after handling.
Do not eat, drink or smoke when using this product.

Response

Immediately call a POISON CENTER or doctor/physician.
If skin irritation occurs, seek medical advice/attention.
IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
Keep container tightly closed.
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
Specific treatment: refer to Label or MSDS.
Remove/Take off immediately all contaminated clothing
IF ON SKIN: Gently wash with plenty of soap and water.
Wash/Decontaminate removed clothing before reuse.

Storage

Store locked up.

Disposal

Dispose of contents and container in accordance with relevant legislation.

continued...

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
potassium cyanide	151-50-8	>90
Decomposes in moist air liberating hydrogen cyanide	74-90-8	

Section 4 - FIRST AID MEASURES

SWALLOWED

IMPORTANT: ESTABLISH A FIRST AID PLAN BEFORE WORKING WITH CYANIDES. ANTIDOTES SHOU
AVAILABLE ON SITE.
· Prompt response in an emergency is vital.
· All workers are to be trained and refresher trained in procedures.
· Rescuers might need the protection of breathing apparatus where there is the potential of exposure to airborne cyanide.
· Use the buddy system and avoid becoming a casualty.
In all cases of cyanide exposure get medical help urgently after administering first aid.
For cyanide poisonings by any route:
· Contact Poisons Advisory Centre or a doctor.
· Seek immediate medical attention.
· Place casualty in coma position.
· Give oxygen when available.
· Consider external cardiac compression, mechanical resuscitation and use of antidote kit.
If breathing stops mouth-to-mouth resuscitation (also called expired air resuscitation - EAR) may be given only as a last resort. Should such resort prove necessary, first wash the casualty's mouth and lips. A first aid attendant giving EAR must not inhale the expired air of the casualty.
US Practice as employed by DuPont:-
FIRST AID Swallowed/ Inhaled /Skin Contact
· If no symptoms, no treatment is necessary; decontaminate patient.
· If conscious but with symptoms present (nausea, shortness of breath, dizziness) give oxygen.
· If consciousness is impaired (slurred speech, drowsiness) give oxygen and amyl nitrite.
· If unconscious but breathing, give oxygen and amyl nitrite by means of a respirator. To give amyl nitrite, break an ampoule in a cloth and insert into lip of mask for 15 seconds , then take away for 15 seconds. Repeat 5-6 times.
First Aid Supplies for cyanide poisoning should be conveniently placed throughout cyanide areas and should be IMMEDIATELY accessible at all times. They should be routinely inspected (typically daily) by people who would use them in an emergency. The total numbers of any item listed below should be adequate to handle the largest number of exposure cases that can reasonably be anticipated, taking into account that some supplies may be wasted, destroyed or inaccessible during an emergency.
Oxygen Resuscitators - The Flynn Series III Model from O-Two Systems has been found satisfactory, being lightweight, rugged and easy to use.
Amyl Nitrite Ampoules - One box of one dozen ampoules per station is usually satisfactory. Stations should be located throughout the cyanide area.
CAUTION: Amyl nitrite is not stable and must be replaced every 1 to 2 years. Store in the original dated box away from heat. (can be stored with the resuscitator).
Avoid storage on vehicles where cabin temperatures can reach 60 deg. C. Storage in high temperature climates may require replacement before the expiry date on the box. Also avoid excessive cold storage which may limit the vapour pressure and reduce its evaporating property. Kits and amyl nitrite should be accessible, but secured against tampering or theft (an increase in the use of nitrite "poppers", as aphrodisiacs,

continued...

introduces substance abuse concerns).
A set of cyanide first aid instructions should be located at each amyl nitrite storage location. Workers should be fully trained since in real emergency situations there will be insufficient time to "read the book".
Notes on the use of amyl nitrite:-
· AN is highly volatile and flammable - do not smoke or use around a source of ignition.
· If treating patient in a windy or draughty area provide some shelter or protection (shirt, wall, drum, cupped hand etc.) to prevent amyl nitrite vapour from being blown away. Keep ampoule upwind from the nose , the objective is to get amyl nitrite into the patient's lungs.
· Rescuers should avoid AN inhalation to avoid becoming dizzy and losing competence.
· Lay the patient down. Since AN dilates blood vessels and lowers blood pressure, lying down will help keep the patient conscious.
· DO NOT overuse - excessive use might put the patient into shock.
· Vasodilatory effects of amyl nitrate may promote fatal cardiac arrhythmias (particularly if the patient is not really poisoned by cyanide).
· the role of amyl nitrate as a competitive inducer of methaemoglobin in the blood stream is highly variable and, alone, may produce levels of methaemoglobin as a low as 5% only. Experience at DuPont plants has not shown any serious after-effects from treatment with amyl nitrite.

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 contact occurs:
· Immediately remove all contaminated clothing, including footwear.
· Flush skin and hair with running water (and soap if available).
· Seek medical attention in event of irritation.

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

· Signs symptoms of acute cyanide poisoning reflect cellular hypoxia and are often non -specific.
· Cyanosis may be a late finding.
· A bradycardic, hypertensive and tachypneic patient suggests poisoning especially if CNS and cardiovascular depression subsequently occurs.
· Immediate attention should be directed towards assisted ventilation, administration of 100% oxygen, insertion of intravenous lines and institution of cardiac monitoring.
· Obtain an arterial blood gas immediately and correct any severe metabolic acidosis (pH below 7.15).
· Mildly symptomatic patients generally require supportive care alone. Nitrites should not be given indiscriminately - in all cases of moderate to severe poisoning, they should

continued...

be given in conjunction with thiosulfate. As a temporizing measure supply amyl nitrite perles (0.2ml inhaled 30 seconds every minute) until intravenous lines for sodium nitrite are established. 10 ml of a 3% solution is administered over 4 minutes to produce 20% methaemoglobin in adults. Follow directly with 50 ml of 25% sodium thiosulfate, at the same rate, IV. If symptoms reappear or persist within 1/2-1 hour, repeat nitrite and thiosulfate at 50% of initial dose. As the mode of action involves the metabolic conversion of the thiosulfate to thiocyanate, renal failure may enhance thiocyanate toxicity.
· Methylene blue is not an antidote. [Ellenhorn and Barceloux: Medical Toxicology]
If amyl nitrite intervention is employed then Medical Treatment Kits should contain the following:
· One box containing one dozen amyl nitrite ampoules
· Two sterile ampoules of sodium nitrite solution (10 mL of a 3% solution in each)
· Two sterile ampoules of sodium thiosulfate solution (50 mL of a 25% solution in each)
· One 10 mL sterile syringe. One 50 mL sterile syringe. Two sterile intravenous needles. One tourniquet.
· One dozen gauze pads.
· Latex gloves
· A "Biohazard" bag for disposal of bloody/contaminated equipment.
· A set of cyanide instructions on first aid and medical treatment.
- Notes on the use of amyl nitrite:-
· AN is highly volatile and flammable - do not smoke or use around a source of ignition.
· If treating patient in a windy or draughty area provide some shelter or protection (shirt, wall, drum, cupped hand etc.) to prevent amyl nitrite vapour from being blown away. Keep ampoule upwind from the nose, the objective is to get amyl nitrite into the patients lungs.
· Rescuers should avoid AN inhalation to avoid becoming dizzy and losing competence.
· Lay the patient down. Since AN dilates blood vessels and lowers blood pressure, lying down will help keep patient conscious.
· DO NOT overuse - excessive use might put the patient into shock. Experience at DuPont plants has not shown any serious after-effects from treatment with amyl nitrite.
ADDITIONAL NOTES:
· Major medical treatment procedures may vary e.g. US (FDA method as recommended by DuPont) uses amyl nitrite as a methaemoglobin generator, followed by treatment with sodium nitrite and then sodium thiosulfate.
MODES OF ACTION: Amyl nitrite (AN) reacts with haemoglobin (HB) to form about 5% methaemoglobin (MHB). Sodium nitrite ($NaNO_2$) reacts with haemoglobin to form approximately 20-30% methaemoglobin. Methaemoglobin attracts cyanide ions (CN) from tissue and binds with them to become cyanmethaemoglobin (CNMHB). Sodium thiosulfate ($Na_2S_2O_3$) converts cyanmethaemoglobin to thiocyanate (HSCN) which is excreted by the kidneys. i.e. AN + HB = MHB $NaNO_2$ + HB = MHB CN + MHB = CNMHB $Na_2S_2O_3$ + CNMHB + O_2 = HSCN
· The administration of the antidote salts is intravenous in normal saline, Ringers lactate or other available IV fluid.
· European practice may use 4-dimethylaminophenol (DMAP) as a methaemoglobin generator. Also hydroxycobalamin (Vitamin B12a) is used. Hydroxycobalamin works by reacting with cyanide to form cyanocobalamin (Vitamin B12) which is excreted in the urine.
· European and Australian NOHSC (Worksafe) propose dicobalt edetate (Kelocyanor) as antidote. This acts by chelating cyanide to form stable cobalticyanide, which is excreted in the urine. In all cases hyperbaric therapy may increase the efficiency of a cyanide antidote kit.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
· Water spray or fog.
· Foam.

continued...

· Dry chemical powder.
· BCF (where regulations permit).
· 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: nitrogen oxides (NOx).
May emit poisonous fumes.

FIRE INCOMPATIBILITY
None known.

Personal Protective Equipment
Breathing apparatus.
Gas tight chemical resistant suit.
Limit exposure duration to 1 BA set 30 mins.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS
Environmental hazard - contain spillage.
· 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
Environmental hazard - contain spillage.
· 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.
· 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.
Cautiously cover spill area with strong alkaline hypochlorite solution and

continued...

allow to stand.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:
potassium cyanide 60 mg/m³

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:
potassium cyanide 5 mg/m³

other than mild, transient adverse effects without perceiving a clearly defined odour is:
potassium cyanide 5 mg/m³

The threshold concentration below which most people will experience no appreciable risk of health effects:
potassium cyanide 5 mg/m³

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

X X + X X +

+: May be stored together
O: May be stored together with specific preventions
X: Must not be stored together

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

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- 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

continued...

-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

Glass 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.
All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.

STORAGE INCOMPATIBILITY

Metal cyanides are readily oxidised and those of some heavy metals show thermal instability.
Metal cyanide and cyanates are often endothermic,Several members of this family of compounds, containing heavy metals tend to explosive instability, and mos are capable of violent oxidation under certain circumstances. Fusion of mixtures of metal cyanides with metal chlorates, perchlorates, nitrates or nitrites cause violent explosion. Addition of one solid component (even in residual amounts) to another molten component is extremely dangerous.
BRETHERICK L.: Handbook of Reactive Chemical Hazards.
Contact with acids produces toxic fumes.
Avoid reaction with oxidising agents.
Avoid reaction with alkaloids, chloral hydrate, carbon dioxide, iodine, metallic salts, permanganates, chlorates, peroxides.
Highly toxic and flammable hydrogen cyanide (HCN) is liberated on contact with incompatible materials.
Decomposes to hydrogen cyanide (HCN) in presence of moist air.

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.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
potassium cyanide	25	
hydrogen cyanide		50 [Unch]

ODOUR SAFETY FACTOR (OSF)

OSF=8.1 (HYDROGEN CYANIDE)
Exposed individuals are NOT reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

continued...

Odour Safety Factor (OSF) is determined to fall into either Class C, D or E.
The Odour Safety Factor (OSF) is defined as:
OSF= Exposure Standard (TWA) ppm/ 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

.

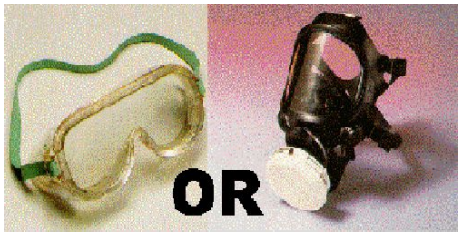
MATERIAL DATA

NOTE: Detector tubes for cyanides, measuring CN in excess of 2mg are commercially available.
Exposure limits with "skin" notation indicate that vapour and liquid may be absorbed through intact skin. Absorption by skin may readily exceed vapour inhalation exposure. Symptoms for skin absorption are the same as for inhalation. Contact with eyes and mucous membranes may also contribute to overall exposure and may also invalidate the exposure standard.

INGREDIENT DATA

HYDROGEN CYANIDE:
Odour threshold: 0.2 - 5.0 ppm., recognition 2.0 - 5.0 ppm.
NOTE: Detector tubes for hydrocyanic acid, measuring in excess of 2 ppm, are commercially available. Long-term (8 hrs) measurements may be conducted to detect concentrations exceeding 1.3 ppm.
The recommended TLV-C is thought to provide protection against the significant risk of headache, fatigue, colic and nervousness observed in individuals exposed at 10 ppm in a full working shift. There are no rigorous studies which demonstrate objective signs of cyanide induced adverse health effects from long-term exposure to HCN in the workplace at concentrations equal to or less than 10 ppm. Although reports do exist which describe diverse and non-specific symptoms attributed to chronic exposures, other chemicals and stressors may also be implicated.

PERSONAL PROTECTION



EYE
· Safety glasses with side shields.
· Chemical goggles.
· 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
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.
Wear chemical protective gloves, eg. PVC.
Wear safety footwear or safety gumboots, eg. Rubber.

OTHER
· Overalls.
· Eyewash unit.
· Barrier cream.
· Skin cleansing cream.

RESPIRATOR

Protection Factor	Half- Face Respirator	Full- Face Respirator	Powered Air Respirator
10 x ES	B P1 Air- line*	- -	B PAPR- P1 -
50 x ES	Air- line**	B P2	B PAPR- P2
100 x ES	-	B P3	-
		Air- line*	-
100+ x ES	-	Air- line**	B 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:	Air Speed:
solvent, vapours, degreasing etc., evaporating	0.25- 0.5 m/s (50- 100 f/min.)

continued...

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)	0.5- 1 m/s (100- 200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening 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 deliquescent crystals or lumps. Slight almond-like odour when damp. Soluble in water, alcohol, methanol, glycerin. Liberates highly toxic hydrogen cyanide (HCN) on reaction with acids and acid fumes. Small amounts of HCN are given off on reaction with water. Odour threshold of HCN is 0.2-5ppm.

PHYSICAL PROPERTIES

Solid.
Mixes with water.
Contact with acids liberates very toxic gas.

Molecular Weight: 65.12	Boiling Range (°C): Not available.
Melting Range (°C): 634.5	Specific Gravity (water=1): 1.52 @ 16 C
Solubility in water (g/L): Miscible	pH (as supplied): Not applicable
pH (1% solution): 11 0.1N aqueous	Vapour Pressure (kPa): Negligible at 2
Volatile Component (%vol): Not applicable.	Evaporation Rate: Not applicable
Relative Vapour Density (air=1): Not applicable.	Flash Point (°C): Non combustible
Lower Explosive Limit (%): Not applicable	Upper Explosive Limit (%): Not applicable

continued...

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Autoignition Temp (°C): Not applicable
State: Divided solid

Decomposition Temp (°C): Not Applicable
Viscosity: Not Applicable

log Kow: 0.35-1.07

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

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

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
Severely toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 5 gram may be fatal or may produce serious damage to the health of the individual.
Symptoms of poisoning may include salivation, nausea without vomiting, anxiety, confusion , vertigo, giddiness, lower jaw stiffness, convulsions, spasm (opisthotonos), paralysis, coma and cardiac arrhythmias Cyanide readily forms stable complexes with biologically active metal ions, notably the ferric ion of cytochrome oxidase, producing significant inhibition of enzyme activity with a consequent loss of a cell's ability to utilise oxygen. Cyanosis (blue-grey discolouration of the skin and lips) is often present in cyanide and nitrile poisonings but may be a late finding. Non-lethal doses of cyanide are eventually released from the complex to be transformed to thiocyanate and excreted in the urine.
Contact with acids liberates very toxic gases.

EYE
It has either been demonstrated or it is expected that when the material is applied to the eye(s) of animals, it produces severe ocular lesions which are present twenty-four hours or more after instillation.

SKIN
Skin contact with the material may produce severely toxic effects; systemic effects may result following absorption and these may be fatal.
Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.
Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may

continued...

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.
May be toxic if absorbed through the skin.
Skin contact may produce "cyanide rash" with itching, also macular, papular and vesicular eruptions. Secondary infections may follow. Contact irritation causes readily reversible change which disappears after exposure ends.
Solution of material in moisture on the skin, or perspiration, may markedly increase skin corrosion and accelerate tissue destruction.

INHALED
Inhalation of dusts, generated by the material during the course of normal handling, may produce severe damage to the health of the individual. Relatively small amounts absorbed from the lungs may prove fatal.
The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation of dusts, or fumes, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.

CHRONIC HEALTH EFFECTS
Long term exposure to high dust concentrations may cause changes in lung function (i.e. 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.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
Chronic exposure to cyanides and certain nitriles may result in interference to iodine uptake by thyroid gland and its consequent enlargement. This occurs following metabolic conversion of the cyanide moiety to thiocyanate. Thyroid insufficiency may also occur as a result of metabolic conversion of cyanides to the corresponding thiocyanate. Exposure to small amounts of cyanide compounds over long periods are reported to cause loss of appetite, headache, weakness, nausea, dizziness, abdominal pain, changes in taste and smell, muscle cramps, weight loss, flushing of the face, persistent runny nose and irritation of the upper respiratory tract and eyes. These symptoms are not specific to cyanide exposure and therefore the existence of a chronic cyanide toxicity remains speculative. Repeated minor contact with cyanides produces a characteristic rash with itching, papules (small, superficial raised spots on the skin) and possible sensitisation. Concerns have been expressed that low-level, long term exposures may result in damage to the nerves of the eye.
. Chronic exposure to levels as low as <10 ppm may include symptoms of runny noses, weakness, dizziness, headache, vomiting, abdominal pain, throat irritation, muscle cramps,
weight loss, flushed face and an altered sense of smell and taste.[CHEMINFO]

TOXICITY AND IRRITATION

TOXICITY	IRRITATION
Oral (human) LDLo: 2.857 mg/kg Oral (man) TDLo: 14 mg/kg Oral (rat) LD50: 5 mg/kg	Nil Reported

HYDROGEN CYANIDE:

TOXICITY	IRRITATION
Oral (human) TDLo: 0.57 mg/kg Inhalation (man) LCLo: 400 mg/m^3/2m Inhalation (human) TCLo: 500 mg/m^3/3m Inhalation (human) TCLo: 200 mg/m^3/10m Inhalation (human) TCLo: 120 mg/m^3/1h Inhalation (rat) LC50: 484 ppm/5m	Nil Reported

continued...

Section 12 - ECOLOGICAL INFORMATION

Marine Pollutant:Yes
Hazardous Air Pollutant: Yes
BCF<100: 0.3

Drinking Water Standards:
cyanide: 70 ug/l (WHO guideline)
Soil Guidelines: Dutch Criteria:
free cyanide: 1 mg/kg (target)
20 mg/kg (intervention)
complex cyanide (pH 5): 5 mg/kg (target)
50 mg/kg (intervention)
Air Quality Standards:
no safe guidelines recommended due to carcinogenic properties.
On the basis of available evidence concerning either toxicity, persistence, potential to accumulate and or observed environmental fate and behaviour, the material may present a danger, immediate or long-term and /or delayed, to the structure and/ or functioning of natural ecosystems.
DO NOT discharge into sewer or waterways.
The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

* Classification of Substances as Ecotoxic (Dangerous to the Environment)
Appendix 8, Table 1
Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993
Commission of the European Communities.
Marine Pollutant
Toxicity Fish: LC50(96)25-180mg/L
LC50: 0.45-0.57 mg/L/96Hr (Bluegill sunfish) Extremely toxic
Toxicity invertebrate: LC50(48)0.18-6mg/L
Nitrif. inhib.: 75% inhib at 680mg/L
Refer to data for ingredients, which follows:

HYDROGEN CYANIDE:
Hazardous Air Pollutant: Yes
Fish LC50 (96hr.) (mg/l): 5.3E- 06 -
Algae IC50 (72hr.) (mg/l): 1.8
log Pow (Verschueren 1983): 0.35/1.07

The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

* Classification of Substances as Ecotoxic (Dangerous to the Environment)
Appendix 8, Table 1
Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993
Commission of the European Communities.
Marine Pollutant
log Kow: 0.35-1.07
Toxicity invertebrate: cell mult. inhib. prtz 0.24mg/L

Section 13 - DISPOSAL CONSIDERATIONS

· Care must be taken when using hypochlorite solution to destroy cyanide wastes by oxidation of cyanates.
· The reaction proceeds readily, even at high pH, but the secondary oxidation

continued...

of cyanate to nitrogen and carbon dioxide is very pH dependent. At pH 11 it is slow but runs-away at pH 10-10.3. This procedure should avoid high pHs, excess of hypochlorite, and moderate or high concentrations of the hypochlorite. Addition of 0.5 ml of cyanide solution to 5 ml of stirred hypochlorite destroyed a gas meter with the violent evolution of gas.
BRETHERICK L.: Handbook of Reactive Chemical Hazards
CAUTION: Concentrated hypochlorite should not be mixed with concentrated cyanide solutions or solid cyanide because highly toxic cyanogen chloride gas will be released.

Waste solutions may also be reacted with ferrous sulfate to form relatively non -toxic ferrocyanide.
· Recycle wherever possible or consult manufacturer for recycling options.
· 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.
· 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.

WASTE DISPOSAL PROCEDURES
• Wear eye protection, protective clothing and nitrile rubber gloves to control personal contact from small quantities of potassium cyanide. Work in a well ventilated area and add a 1% solution of sodium hydroxide. With stirring, add household bleach (70ml/g of cyanide). Follow the spills procedure for more information.

SPILLAGE DISPOSAL
• Wear breathing apparatus, eye protection, protective clothing and butyl rubber
gloves to control personal contact from potassium cyanide solutions. Clear area of personnel. Cover and contain the spill with a 1:1:1 mixture by weight of sodium carbonate or calcium carbonate, bentonite and sand. Scoop the mixture into a container and transport to a well ventilated area. With stirring add the absorbed mixture to a container of household bleach. Perform the Prussian blue test to check for the presence of cyanide. To 1mL of the solution, add 2 drops of a freshly prepared 5% aqueous ferrous sulfate solution. Allow the mixture to boil for at least 60 seconds. Cool to room temperature, and add 2 drops of 1% ferric chloride solution. Add 6M hydrochloric acid until an acidic mixture forms. Allow a deep blue precipitate to form, this means that cyanide is still present. Repeat the test after more bleach is added to the cyanide solution. When the test is negative, empty the solution into the drain with copious amounts of water. Wash the area of the spill thoroughly with water. Dispose of the solid residue with normal refuse. Wear nitrile rubber gloves, protective clothing and eye protection to control personal contact from solid potassium cyanide. Scoop the mixture into a container for transfer to a well ventilated area. Add to 1% sodium hydroxide solution. With stirring add household bleach. Follow the spillage procedure for solution spills for further information. Wash the area of the spill with water and detergent [Armour 1996].

continued...

Section 14 - TRANSPORTATION INFORMATION

Labels Required: TOXIC
HAZCHEM: 2X

UNDG:

Dangerous Goods Class:	6.1	Subrisk:	None
UN Number:	1680	Packing Group:	I

Shipping Name:POTASSIUM CYANIDE, SOLID

Air Transport IATA:

ICAO/IATA Class:	6.1	ICAO/IATA Subrisk:	None
UN/ID Number:	1680	Packing Group:	I
ERG Code:	6L		

Shipping name:POTASSIUM CYANIDE, SOLID

Maritime Transport IMDG:

IMDG Class:	6.1	IMDG Subrisk:	None
UN Number:	1680	Packing Group:	I
EMS Number:	F- A, S- A	Marine Pollutant:	Yes

Shipping name:POTASSIUM CYANIDE, SOLID

Section 15 - REGULATORY INFORMATION

REGULATIONS

potassium cyanide (CAS: 151-50-8) is found on the following regulatory lists;
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

No data available for potassium cyanide as CAS: 15745-74-1, CAS: 60195-52-0, CAS: 133708-36-8.

Section 16 - OTHER INFORMATION

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
potassium cyanide	151- 50- 8, 15745- 74- 1, 60195- 52- 0, 133708- 36- 8

continued...

Section 16 - OTHER INFORMATION

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 to determine the suitability of the information for their particular purpose.

Issue Date: 16-Aug-2017