

# Caffeine

sc-202514



The Power is Question

## Material Safety Data Sheet

Hazard Alert Code  
Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

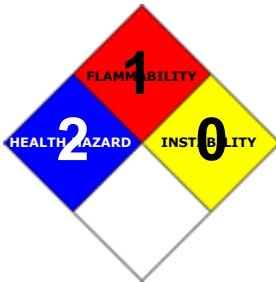
### PRODUCT NAME

Caffeine

### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

### NFPA



### SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

2145 Delaware Ave

Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: CHEMWATCH: From within the US and  
Canada: 877-715-9305

Emergency Tel: From outside the US and Canada: +800 2436  
2255 (1-800-CHEMCALL) or call +613 9573 3112

### PRODUCT USE

Central nervous system stimulant used in beverages and medicine (cardio-vascular and psychostimulant analeptic). Administered in powder or tablets in doses of 100 to 300 mg. Frequently included in analgesic preparations with aspirin or codeine. Use in soft drinks not to exceed 0.02%. Approx. caffeine content of various beverages per 6 oz cup: brewed coffee: 100 to 150 mg; 'instant' coffee: 60 to 80 mg; decaffeinated coffee 3 to 5 mg; tea 40 to 100 mg; cola drinks: 17 to 55 mg.

### SYNONYMS

C8-H10-N4-O2, "3, 7-dihydro-1, 3, 7-trimethyl-1H-purine-2, 6-dione", "3, 7-dihydro-1, 3, 7-trimethyl-1H-purine-2, 6-dione", "1H-purine, 2, 6-dione, 3, 7-dihydro-1, 3, 7-trimethyl-", "1H-purine, 2, 6-dione, 3, 7-dihydro-1, 3, 7-trimethyl-", methyltheobromine, "theobromine, 1-methyl-", "theobromine, 1-methyl-", "theophylline, 7-methyl-", "theophylline, 7-methyl-", "1, 3, 7-trimethylxanthine", "1, 3, 7-trimethylxanthine", caffeine, coffein, coffeine, coffeinum, "Eldiatric C", Guaranine, Kofein, Koffein, No-Doz, Organex, Thein, Theine, "102584 caffeine pure BP"

## Section 2 - HAZARDS IDENTIFICATION

### CANADIAN WHMIS SYMBOLS



### EMERGENCY OVERVIEW

#### RISK

Harmful if swallowed.

### POTENTIAL HEALTH EFFECTS

#### ACUTE HEALTH EFFECTS

## SWALLOWED

- Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.
- Xanthine derivatives may produce nausea, vomiting, anorexia, stomach pain, vomiting of blood and diarrhea. Protein in the urine, increased amounts of urine output, and increased excretion of renal tubular cells and red blood cells may also occur. Effects on breathing may include increased rate and stoppage. Central nervous system effects may include restlessness, dizziness, headache, sleep disturbance, very brisk reflexes, stammering speech, muscle twitches and convulsions alternating with severe depression. Overdose can cause coma. Cardiovascular effects include palpitations, low blood pressure, fast heart rate, extra contractions, life-threatening irregularities of the ventricles and failure of circulation. Other symptoms of overexposure include rash, fever, flushing, high blood sugar, inappropriate secretion of antidiuretic hormone, and relaxation of the smooth muscle of the airways.
- Low doses of caffeine are safe although mildly stimulatory. Acute poisoning is characterized by nausea and vomiting, loss of appetite, vomiting blood, gastrointestinal upset, increased urination and dehydration. Muscle twitches, changes in tone, sensitivity, forced biting and contractions are also seen. Other symptoms include ringing in the ears, enlarged blindspot with colored shimmering lights, irregular heart beats, increased heart rate and irregularities in urination. Stimulation of gastric secretions can result in peptic ulcers. Low doses may cause a small decrease in heart rate, higher doses cause a wide range of symptoms including headache, chills, fever, dizziness, light-headedness, nervousness, sleep loss, pinpoint pupils, blurred vision, sensitivity to light and double vision. Excitement, vertigo and coma may result. Increased rate of metabolism and electrolyte imbalances in the blood may be seen, as are breathing difficulties, chest tightness, palpitations, irregularities in heart rhythm and high blood pressure. Severe overdoses may cause seizures, followed by death.

## EYE

- Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

## SKIN

- Skin contact is not thought to produce harmful health effects (as classified using animal models). Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions 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.

## INHALED

- The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
- Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
- Inhalation of caffeine dusts or aerosols may produce nose and throat irritation, coughing and chest discomfort. The material may act as a stimulant following massive inhalations. Heavy exposure may produce palpitation, excitement, insomnia, dizziness, headache and vomiting.

## CHRONIC HEALTH EFFECTS

- There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.

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

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. Prime symptom is breathlessness; lung shadows show on X-ray. Headaches, tension and nervousness are characteristics of excessive caffeine consumption. Over long periods agitation, psychosis, heartburn and hyperventilation can occur. A mild fever is sometimes seen and the heart and breathing may stop. Prolonged use of drinks containing caffeine can result in tolerance, dependency and if administration is suddenly stopped, withdrawal symptoms can occur. Constipation and mental depression may also be implicated. Caffeine taken in pregnancy has been associated with miscarriage, abnormal birth positions, stillbirths, premature births and low birth weight. There may be an increased rate of cancer.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

### HAZARD RATINGS

	Min	Max
Flammability:	1	
Toxicity:	2	
Body Contact:	0	
Reactivity:	1	
Chronic:	2	

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4



NAME	CAS RN	%
caffeine	58-08-2	>99

## Section 4 - FIRST AID MEASURES

### SWALLOWED

-

- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:
- For advice, contact a Poisons Information Center or a doctor.
- Urgent hospital treatment is likely to be needed.
- If conscious, give water to drink.
- INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

#### EYE

- If this product comes in contact with the eyes:
  - Wash out immediately with fresh 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.
  - If pain persists or recurs seek medical attention.
  - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

#### SKIN

- If skin or hair contact occurs:
  - 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.

#### NOTES TO PHYSICIAN

- Treat symptomatically.

for caffeine intoxication: If caffeine has been ingested within 4 hours in amounts over 15 mg/kg, removal from the stomach by Ipecac syrup or gastric lavage is recommended. Activated charcoal is probably useful within the first 4 hours. Magnesium sulfate cathartic may be useful.

### Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not applicable.
Upper Explosive Limit (%):	Not available.
Specific Gravity (water=1):	1.23
Lower Explosive Limit (%):	Not available.

#### EXTINGUISHING MEDIA

- - Foam.
  - Dry chemical powder.
  - BCF (where regulations permit).
  - Carbon dioxide.
  - Water spray or fog - Large fires only.

#### FIRE FIGHTING

- - Alert Emergency Responders 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.

#### GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- - Combustible solid which burns but propagates flame with difficulty.
  - Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
  - Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
  - Build-up of electrostatic charge may be prevented by bonding and grounding.
  - Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

### FIRE INCOMPATIBILITY

- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

### PERSONAL PROTECTION

Glasses:

Gloves:

Respirator:

Particulate

## Section 6 - ACCIDENTAL RELEASE MEASURES

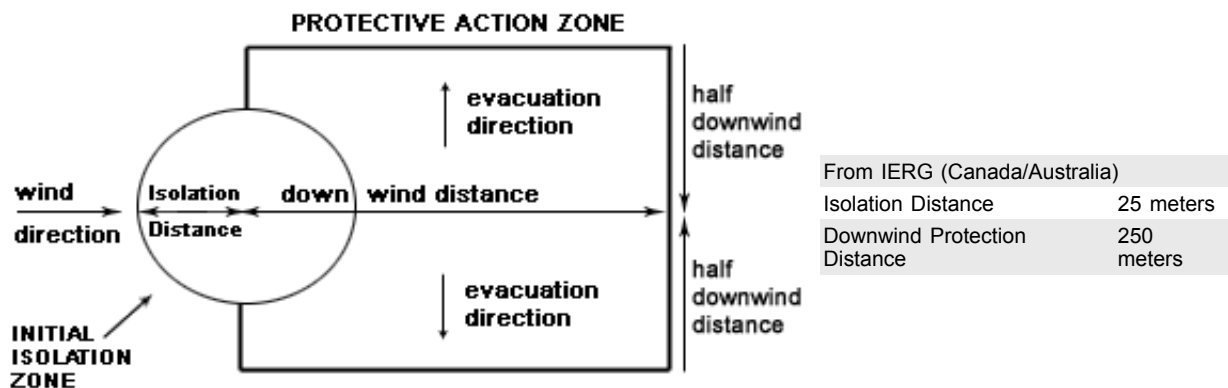
### MINOR SPILLS

- - Clean up waste regularly and abnormal spills immediately.
  - Avoid breathing dust and contact with skin and eyes.
  - Wear protective clothing, gloves, safety glasses and dust respirator.
  - Use dry clean up procedures and avoid generating dust.
  - Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
  - Dampen with water to prevent dusting before sweeping.
  - Place in suitable containers for disposal.

### MAJOR SPILLS

- - Clear area of personnel and move upwind.
  - Alert Emergency Responders 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 labeled containers for recycling.
  - Neutralize/decontaminate residue.
  - Collect solid residues and seal in labeled 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.

### PROTECTIVE ACTIONS FOR SPILL



### FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.

5 Guide 151 is taken from the US DOT emergency response guide book.

6 IERG information is derived from CANUTEC - Transport Canada.

### ACUTE EXPOSURE GUIDELINE LEVELS (AEG) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted

that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

## 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-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.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

### RECOMMENDED STORAGE METHODS

- Glass container.
- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled 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, there must be sufficient inert cushioning material in contact with inner and outer packages \* . - In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage \*. - \* unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.

### 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.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

## EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
US - Oregon Permissible Exposure Limits (Z3)	caffeine (Inert or Nuisance Dust: (d) Total dust)		10						*
US OSHA Permissible Exposure Levels (PELs) - Table Z3	caffeine (Inert or Nuisance Dust: (d) Respirable fraction)		5						
US OSHA Permissible Exposure Levels (PELs) - Table Z3	caffeine (Inert or Nuisance Dust: (d) Total dust)		15						
US - Hawaii Air Contaminant Limits	caffeine (Particulates not otherwise regulated - Total dust)		10						
US - Hawaii Air Contaminant Limits	caffeine (Particulates not otherwise regulated - Respirable fraction)		5						
US - Oregon Permissible Exposure Limits (Z3)	caffeine (Inert or Nuisance Dust: (d) Respirable fraction)		5						*
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	caffeine (Particulates not otherwise regulated Respirable fraction)		5						
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	caffeine (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction)		5						
US - Michigan Exposure Limits for Air Contaminants	caffeine (Particulates not otherwise regulated, Respirable dust)		5						

## MATERIAL DATA

### CAFFEINE:

■ Airborne particulate or vapor must be kept to levels as low as is practicably achievable given access to modern engineering controls and monitoring hardware. Biologically active compounds may produce idiosyncratic effects which are entirely unpredictable on the basis of literature searches and prior clinical experience (both recent and past).

OEL STEL (Russia): 0.5 mg/m<sup>3</sup>

## PERSONAL PROTECTION



Consult your EHS staff for recommendations

### EYE

■ For laboratory, larger scale or bulk handling or where regular exposure in an occupational setting occurs:

- Chemical goggles
- Face shield. 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

■ Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

- Rubber gloves (nitrile or low-protein, powder-free latex). Employees allergic to latex gloves should use nitrile gloves in preference.
- Double gloving should be considered.
- PVC gloves.
- Protective shoe covers.
- Head covering.

### OTHER

- 
- For quantities up to 500 grams a laboratory coat may be suitable.
- For quantities up to 1 kilogram a disposable laboratory coat or coverall of low permeability is recommended. Coveralls should be buttoned at collar and cuffs.
- For quantities over 1 kilogram and manufacturing operations, wear disposable coverall of low permeability and disposable shoe covers.
- For manufacturing operations, air-supplied full body suits may be required for the provision of advanced respiratory protection.
- Eye wash unit.
- Ensure there is ready access to an emergency shower.
- For Emergencies: Vinyl suit
- 
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

## RESPIRATOR

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

\* - Negative pressure demand \*\* - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 65°C).

Type B for use against certain inorganic gases and other acid gases and vapors.

Type E for use against sulfur dioxide and other acid gases and vapors.

Type K for use against ammonia and organic ammonia derivatives

Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.

Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.

Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

## ENGINEERING CONTROLS

■ Enclosed local exhaust ventilation is required at points of dust, fume or vapor generation.

HEPA terminated local exhaust ventilation should be considered at point of generation of dust, fumes or vapors.

Barrier protection or laminar flow cabinets should be considered for laboratory scale handling.

The need for respiratory protection should also be assessed where incidental or accidental exposure is anticipated: Dependent on levels of contamination, PAPR, full face air purifying devices with P2 or P3 filters or air supplied respirators should be evaluated.

Fume-hoods and other open-face containment devices are acceptable when face velocities of at least 1 m/s (200 feet/minute) are achieved. Partitions, barriers, and other partial containment technologies are required to prevent migration of the material to uncontrolled areas. For non-routine emergencies maximum local and general exhaust are necessary. 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, vapors, etc. evaporating from tank (in still air)	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, 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.)
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 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 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

### PHYSICAL PROPERTIES

Solid.

Does not mix with water.

Sinks in water.

State	Divided solid	Molecular Weight	194.22
Melting Range (°F)	Not available	Viscosity	Not Applicable
Boiling Range (°F)	352.4	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	Not Available	pH (1% solution)	7
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	1697	Vapour Pressure (mmHG)	Not applicable.
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	1.23
Lower Explosive Limit (%)	Not available.	Relative Vapor Density (air=1)	Not applicable.
Volatile Component (%vol)	Not applicable	Evaporation Rate	Not applicable

### APPEARANCE

White fleecy masses or long, flexible, silky crystals or powder. Odourless with a bitter taste. Slightly soluble in water and alcohol. Soluble in chloroform; very slightly soluble in ether.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

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

### STORAGE INCOMPATIBILITY

- - Avoid strong acids, bases.
- Avoid reaction with oxidizing agents.

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

## Section 11 - TOXICOLOGICAL INFORMATION

caffeine

### TOXICITY AND IRRITATION

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

TOXICITY	IRRITATION
Oral (human) LDLo: 192 mg/kg	Nil reported.
Oral (woman) LDLo: 1000 mg/kg	
Oral (man) TDLo: 13 mg/kg	
Oral (rat) LD50: 192 mg/kg	
Oral (Rat) LD50: 7080 mg/kg	
Oral (Human) LD: 400 mg/kg	
Oral (Human) TDLo: 140 mg/kg	
Oral (Human) TDLo: 51 mg/kg	
Oral (Human) TDLo: 96 mg/kg	
Oral (Human) LD: 192 mg/kg	
Oral (Human) LD: 320 mg/kg	
Intravenous (Human) TDLo: 7 mg/kg	
Intravenous (Human) TDLo: 68 mg/kg	
Intravenous (Human) LD: 57 mg/kg	
Intraperitoneal (Rat) LD50: 240 mg/kg	



Subcutaneous (Rat) LD50: 170 mg/kg
Intravenous (Rat) LD50: 105 mg/kg
Oral (Mouse) LD50: 127 mg/kg
Intraperitoneal (Mouse) LD50: 168 mg/kg
Subcutaneous (Mouse) LD50: 242 mg/kg
Intravenous (Mouse) LD50: 62 mg/kg
Oral (Dog) LD50: 140 mg/kg
Subcutaneous (Dog) LD50: 100 mg/kg
Intravenous (Dog) LD: 4 mg/kg
Oral (Cat) LD: 100 mg/kg
Intraperitoneal (Cat) LD: 180 mg/kg
Subcutaneous (Cat) LD: 150 mg/kg
Intravenous (Cat) LD: 80 mg/kg
Oral (Rabbit) LD50: 224 mg/kg
Intraperitoneal (Rabbit) LD: 150 mg/kg
Subcutaneous (Rabbit) LD: 275 mg/kg
Intravenous (Rabbit) LD50: 58 mg/kg
Oral (Guinea pig) LD50: 230 mg/kg
Intraperitoneal (Guinea pig) LD: 220 mg/kg
Subcutaneous (Guinea pig) LD: 200 mg/kg
Subcutaneous (Pig) LD: 140 mg/kg
Intravenous (Cat) TDLo: 2.5 mg/kg
Intravenous (Cat) TDLo: 20 mg/kg

■ **The substance is classified by IARC as Group 3:**

NOT classifiable as to its carcinogenicity to humans.  
 Evidence of carcinogenicity may be inadequate or limited in animal testing.  
 Oral (woman) TDLo: 96 mg/kg/1d-I  
 Tumorigenic - Carcinogenic by RTECS criteria.

**CARCINOGEN**

Caffeine	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group 3
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**Section 12 - ECOLOGICAL INFORMATION**

Refer to data for ingredients, which follows:

CAFFEINE:

■ log Kow (Sangster 1997):	- 0.07
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■ For caffeine:

Environmental fate:

Terrestrial fate: If released to soil, estimated soil adsorption coefficients ranging from 18 to 22 indicate that caffeine will display very high mobility. An estimated Henry's Law constant of  $1.9 \times 10^{-19}$  atm-cu m/mole at 25 deg C indicates that it will not volatilise from moist soil to the atmosphere. An estimated vapor pressure of  $<1 \times 10^{-8}$  mm Hg at 25 deg C indicates that it will also not volatilise from dry soil to the atmosphere. Limited data indicate that caffeine has the potential to biodegrade in soil.

Aquatic fate: If released to water, the estimated Henry's Law constant indicates that caffeine will not volatilise from water to the atmosphere. Estimated bioconcentration factors ranging from 0.52 to 2.25 indicate that caffeine will not bioconcentrate in fish and aquatic organisms. Estimated soil adsorption coefficients ranging from 18-22 indicate that it will not adsorb to sediment and suspended organic matter. Limited data indicate that caffeine will biodegrade in water under aerobic conditions. The pKa of caffeine, 14, and its pKb, 14.2, indicates that it is both a weak acid and a weak base; however, it may exist as a dissociated (zwitterionic) species under aqueous conditions.

Atmospheric fate: If released to the atmosphere, an estimated rate constant for the gas-phase reaction of caffeine with photochemically produced hydroxyl radicals of  $1.52 \times 10^{-10}$  cu cm/mole-sec translates to an atmospheric half-life of 2.5 hrs. The estimated vapor pressure of caffeine indicates that it will exist predominately absorbed to particulates in the atmosphere, which may attenuate the rate of hydroxyl radical oxidation.

■ DO NOT discharge into sewer or waterways.

**Ecotoxicity**

Ingredient caffeine	Persistence: Water/Soil HIGH	Persistence: Air	Bioaccumulation LOW	Mobility HIGH
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**Section 13 - DISPOSAL CONSIDERATIONS**

**Disposal Instructions**

All waste must be handled in accordance with local, state and federal regulations.

! Puncture containers to prevent re-use and bury at an authorized landfill.

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 equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

## Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	None	Hazard class or Division:	6.1
Identification Numbers:	UN1544	PG:	III
Label Codes:	6.1	Special provisions:	IB8, IP3, T1, TP33
Packaging: Exceptions:	153	Packaging: Non-bulk:	213
Packaging: Exceptions:	153	Quantity limitations: Passenger aircraft/rail:	100 kg
Quantity Limitations: Cargo aircraft only:	200 kg	Vessel stowage: Location:	A
Vessel stowage: Other:	None		

Hazardous materials descriptions and proper shipping names:

Alkaloids, solid, n.o.s. or Alkaloid salts, solid, n.o.s. poisonous

### Air Transport IATA:

ICAO/IATA Class:	6.1	ICAO/IATA Subrisk:	None
UN/ID Number:	1544	Packing Group:	III
Special provisions:	A3		

Shipping Name: ALKALOID SALTS, SOLID, N.O.S. \*(CONTAINS CAFFEINE)

### Maritime Transport IMDG:

IMDG Class:	6.1	IMDG Subrisk:	None
UN Number:	1544	Packing Group:	III
EMS Number:	F-A,S-A	Special provisions:	43 223 274 944
Limited Quantities:	5 kg		

Shipping Name: ALKALOIDS, SOLID, N.O.S. or ALKALOIDS SALTS, SOLID, N.O.S.(contains caffeine)

## Section 15 - REGULATORY INFORMATION

**caffeine (CAS: 58-08-2,5743-12-4,75639-14-4) is found on the following regulatory lists;**

"Canada Domestic Substances List (DSL)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US EPA High Production Volume Program Chemical List", "US FDA Direct Food Substances Generally Recognized as Safe", "US Food Additive Database", "US Toxic Substances Control Act (TSCA) - Inventory"

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

- Inhalation may produce health damage\*.
- Cumulative effects may result following exposure\*.
- Limited evidence of a carcinogenic effect\*.

\* (limited evidence).

### Ingredients with multiple CAS Nos

Ingredient Name	CAS
caffeine	58-08-2, 5743-12-4, 75639-14-4

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■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:  
[www.chemwatch.net/references](http://www.chemwatch.net/references).

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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