Carbofuran-3-keto

sc-227575

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Carbofuran-3-keto

STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA


SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800
EMERGENCY:
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C12-H13-N-O4, "3(2H)-benzofuranone, 2, 2-dimethyl-7-[(metylamino)carbonyl)oxy]-", "2, 2-dimethyl-7-[((methylamino)carbonyl)oxy]-3(2H)-benzofuranone", "carbamic acid, methyl-, ester with", "7-hydroxy-2, 2-dimethyl-3(2H)-benzofuranone", "methylcarbamic acid ester with 7-hydroxy-2, 2-dimethyl-3(2H)-benzofuranone", 3-oxocarbofuranone, "2, 3-dihydro-2, 2-dimethyl-3-keto-7-benzofuranyl-N-methyl carbamate", "carbofuran, 3-keto-", "methylcarbamic acid-2, 3-dihydro-3-hydroxy-2, 2-dimethyl-7-benzofuranyl", ester, "insecticide/ nematocide"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	1		
Toxicity:	3		
Body Contact:	2		
Reactivity:	1		
Chronic:	2		

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

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Harmful if swallowed.
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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.
■ Ingestion may produce nausea, vomiting, depressed appetite, abdominal cramps,and diarrhea.
■ Carbofuran poisoning was reported in three female farm workers who were not wearing any protective clothing and were throwing carbofuran granules in a coffee plantation in Jamaica.
Signs of poisoning included vomiting, lassitude, nausea and hypersalivation.

EYE

■ There is some evidence to suggest that this material can causeeye irritation and damage in some persons.
■ Direct eye contact can produce tears, eyelid twitches, pupil contraction, loss of focus, and blurred or dimmed vision.
Dilation of the pupils occasionally occurs.
■ Carbofuran formulations of 25% wettable powder and 75% wettable powder were lethal when applied to rabbit eyes at doses of 21.
5 mg/kg and 18.

SKIN

■ The material is not thought to be a skin irritant (as classified using animal models).
Abrasive damage however, may result from prolonged exposures.
■ Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
■ There may be sweating and muscle twitches at site of contact.
Reaction may bedelayed by hours.
■ 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 produce serious damage 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.
■ Poisoning due to cholinesterase inhibitors causes symptoms such as increased blood flow to the nose, watery discharge, chest discomfort, shortness of breath and wheezing.
Other symptoms include increased production of tears, nausea and vomiting, diarrhea, stomach pain, involuntary passing of urine and stools, chest pain, breathing difficulty, low blood pressure, irregular heartbeat, loss of reflexes, twitching, visual disturbances, altered pupil size, convulsions, lung congestion, coma and heart failure.
■ Symptoms of carbamate poisoning are similar to that of organophosphate poisoning, however, recover from carbamate poisoning is quicker and generally less likely to be cause death.
■ Workers exposed to carbofuran by the inhalation route experienced blurred vision, nausea, excessive perspiration and a sense of weakness.
Recovery was complete in a few hours but was considerably faster when atropine was administered.

CHRONIC HEALTH EFFECTS

■ 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.
Repeated or prolonged exposures to cholinesterase inhibitors produce symptoms similar to acute effects. In addition workers exposed repeatedly to these substances may exhibit impaired memory and loss of concentration, severe depression and acute psychosis, irritability, confusion, apathy, emotional liability, speech difficulties, headache, spatial disorientation, delayed reaction times, sleepwalking, drowsiness or insomnia.
In a chronic feeding study in the rat, the highest dietary level of carbofuran having no effect was 25 ppm; for the dog it was 20 ppm.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
3-ketocarbofuran	16709-30-1	>98

Section 4 - FIRST AID MEASURES

SWALLOWED
■ If swallowed: · Contact a Poisons Information Center or a doctor at once. · If swallowed, activated charcoal may be advised.

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.

SKIN
■ If product comes in contact with skin: · Contact a Poisons Information Center or a doctor. · DO NOT allow clothing wet with product to remain in contact with skin, strip all contaminated clothing including boots.

INHALED
· If spray mist, vapor are inhaled, remove from contaminated area. · Contact a Poisons Information Center or a doctor at once.

NOTES TO PHYSICIAN
■ Following acute or short term repeated exposures to carbamates:
· Carbamylation of acetylcholinesterase produces symptoms of muscarinic and nicotinic poisoning. Clinical effects disappear within 24 hours following spontaneous, in vivo, hydrolysis of the complex. Symptoms develop within 15 minutes to 2 hours.
· Access the adequacy of the airway and ventilation and use oxygen, suction, intubation, artificial ventilation, intravenous lines and cardiac monitors as needed.

Section 5 - FIRE FIGHTING MEASURES

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

EXTINGUISHING MEDIA
· Foam.
· Dry chemical powder.

FIRE FIGHTING
· Alert Emergency Responders and tell them location and nature of hazard.
· Wear full body protective clothing with breathing apparatus.
· If containment of runoff is not possible, consider allowing fire to burn-out. Use of water may present a significant pollution hazard.
When any large container (including road and rail tankers) is involved in a fire,
consider evacuation by 800 metres in all directions.

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.
Combustion products include: carbon monoxide (CO), carbon dioxide (CO_2), nitrogen oxides (NOx), 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:
Chemical goggles.
Gloves:
Respirator:
Particulate dust filter.

Section 6 - ACCIDENTAL RELEASE MEASURES

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
· Clear area of personnel and move upwind.
· Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
· Avoid all personal contact, including inhalation.
· Wear protective clothing when risk of exposure occurs.
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
· Lined metal can, Lined metal pail/drum
· Plastic pail.
Glass container.
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.
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 REQUIREMENTS
· Store in original containers.
· Store at -20˚C.
· Keep containers securely sealed.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

• 3-ketocarbofuran: CAS:16709-30-1

PERSONAL PROTECTION




RESPIRATOR
• Particulate dust filter. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

EYE
· Safety glasses with side shields.
· Chemical goggles.

HANDS/FEET
■ Wear chemical protective gloves, eg. PVC.
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, AS/NZS 2161.1 or national equivalent).
· 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, AS/NZS 2161.10.1 or national equivalent) 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, AS/NZS 2161.10.1 or national equivalent) 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.

OTHER
· Overalls.
· Eyewash unit.
· Ensure that there is a supply of atropine tablets on hand
· Ensure all employees have been informed of symptoms of cholinesterase poisoning and that the use of atropine in first aid is understood .

ENGINEERING CONTROLS
· Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
· Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES
Does not mix with water.
Toxic or noxious vapours/gas.

State	DIVIDED SOLID	Molecular Weight	235.24
Melting Range (°F)	Not available	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	Not available	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	Not applicable
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

APPEARANCE
Solid; does not mix well with water

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY
· Presence of incompatible materials.
· Product is considered stable.

STORAGE INCOMPATIBILITY
· Carbamates are incompatible with strong acids and bases, and especially incompatible with strong reducing agents such as hydrides.
· Flammable gaseous hydrogen is produced by the combination of active metals or nitrides with carbamates.

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

Section 11 - TOXICOLOGICAL INFORMATION

3-ketocarbofuran

TOXICITY AND IRRITATION
3-KETOCARBOFURAN:
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 295 mg/kg	Nil Reported
Oral (mouse) LD50: 10 mg/kg	

■ for carbofuran
Carbofuran poisoning was reported in three female farm workers who were not wearing any protective clothing and were throwing carbofuran granules in a coffee plantation in Jamaica. Signs of poisoning included vomiting, lassitude, nausea and hypersalivation. Cholinesterase activity was not determined in these patients.
Carbofuran is rapidly absorbed, metabolized and eliminated, mainly in the urine, after oral administration to mice, rats, hens and goats. After oral administration of [14C]phenyl carbofuran to rats, 92% of the radiolabel was eliminated in the urine and 3% in faeces. Most of the radiolabel was eliminated within 24 h after treatment. With a [14C]carbonyl-labelled compound, 45% was eliminated as 14CO2. The metabolic pathway consists of hydroxylation, oxidation, hydrolysis and conjugation.
Carbofuran is highly toxic after acute oral administration. The oral LD50 values in cats, rabbits, guinea-pigs, rats, mice and dogs ranged from 3 to 19 mg/kg of body weight. Toxic signs observed were typical for cholinesterase inhibition; salivation, cramps, trembling and sedation were observed within minutes after administration and lasted for up to 3 days. WHO (2001) has classified carbofuran as "highly hazardous"
In a 13-week study, carbofuran (purity 99.6%) was fed to groups of beagle dogs. The highest dose was reduced from 500 mg/kg of feed because of marked toxicity. Hyperaemia, increased salivation and inhibition of erythrocyte acetylcholinesterase activity were observed at the lowest dose. A NOAEL was not identified in this study. In a subsequent 4-week study, groups of male beagle dogs (four per group) were fed carbofuran (purity 99.6%) at 0 or 5 mg/kg of feed (equal to 0 and 0.22 mg/kg of body weight per day). Clinical signs, mortality, body weight, food consumption and cholinesterase activity in plasma and erythrocytes were unaffected by treatment. The NOAEL in this study was 0.22 mg/kg of body weight per day, the only dose tested.
In a 2-year study, Charles River mice (100 per sex per group) were fed dietary carbofuran (purity 95.6%) concentrations of 0, 20, 125 or 500 mg/kg of feed (equal to 0, 2.8, 18 and 70 mg/kg of body weight per day). Mice receiving the highest dose showed a decrease in body weight gain. Cholinesterase activities were not measured in erythrocytes or plasma. At the two highest doses, a statistically significant depression of brain acetylcholinesterase activity was observed. The NOAEL was 20 mg/kg of feed, equal to 2.8 mg/kg of body weight per day.
Reproductive and developmental toxicity: In a three-generation reproductive toxicity study, Charles River rats were fed carbofuran (purity 95.6%) at concentrations of 0, 20 or 100 mg/kg of feed (equal to 0, 1.2 and 6 mg/kg of body weight per day for males and 0, 1.9 and 9.7 mg/kg of body weight per day for females). The NOAEL was 20 mg/kg of feed, equal to 1.2 mg/kg of body weight per day, on the basis of reductions in body weight gain in the parental generation and reductions in the growth and survival of pup generations at 100 mg/kg of feed.
In a further study of teratogenicity, groups of Charles River rats (40 females per group) were fed carbofuran (purity 95.6%) at dietary concentrations of 0, 20, 60 or 160 mg/kg of feed (equal to 0, 1.5, 4.4 and 11 mg/kg of body weight per day) on days 6-19 of gestation. The NOAEL for pup toxicity was 60 mg/kg of feed (equal to 4.4 mg/kg of body weight per day), based on reduced pup weight at 160 mg/kg of feed. The NOAEL for maternal toxicity was 20 mg/kg of feed (equal to 1.5 mg/kg of body weight per day), based on reduced body weight gain at the two highest doses. None of these studies showed teratogenic potential.
In an early teratogenicity study, New Zealand white rabbits (17 animals per group) were given carbofuran (purity 95.6%) by gavage at doses of 0, 0.2, 0.6 or 2 mg/kg of body weight per day on gestation days 6–18. Maternal toxicity was observed at 2 mg/kg of body weight per day and included trembling, salivation, sneezing, chewing motions and reduced food and water consumption. The NOAEL in this study was 0.6 mg/kg of body weight per day.
Neurotoxicity studies: In a 90-day study in Sprague-Dawley rats (10 per sex per group) at dietary carbofuran (purity 98.6%) concentrations of 0, 50, 500 or 1000 mg/kg of feed (equal to 0, 2.4, 27.3 and 55.3 mg/kg of body weight per day in males and 0, 3.1, 35.3 and 64.4 mg/kg of body weight per day in females), systemic toxicity (reduction in body weight gain) was observed at all doses. Clinical signs of neurotoxicity were observed at 500 and 1000 mg/kg of feed. No histopathological lesions were found in the nervous system. The NOAEL for neurotoxicity was thus 50 mg/kg of feed, equal to 2.4 mg/kg of body weight per day. There was no NOAEL for systemic toxicity.
Mutagenicity and related end-points: Carbofuran has been tested for genotoxicity in a wide range of tests in vivo and in vitro.It was concluded that carbofuran it was not genotoxic.
Carcinogenicity: No evidence of tumorigenicity was found in the 2-year dietary studies on mice and rats .

CARCINOGEN

PBIT_(PERS~	US - Maine Chemicals of High Concern List	Carcinogen

Section 12 - ECOLOGICAL INFORMATION

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
This material and its container must be disposed of as hazardous waste.
Avoid release to the environment.
Refer to special instructions/ safety data sheets.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
3-ketocarbofuran	HIGH	No Data Available	LOW	HIGH

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.
· Consult manufacturer for recycling options.
· Consult Waste Management Authority for disposal options.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 6.1
Identification Numbers: UN2757 PG: II
Label Codes: 6.1 Special provisions: IB8, IP2,
IP4, T3,
TP33
Packaging: Exceptions: 153 Packaging: Non- bulk: 212
Packaging: Exceptions: 153 Quantity limitations: 25 kg
Passenger aircraft/rail:
Quantity Limitations: Cargo 100 kg Vessel stowage: Location: A
aircraft only:
Vessel stowage: Other: 40
Hazardous materials descriptions and proper shipping names:
Carbamate pesticides, solid, toxic

Air Transport IATA:
UN/ID Number: 2757 Packing Group: II
Special provisions: A3
Cargo Only
Packing Instructions: 676 Maximum Qty/Pack: 100 kg
Passenger and Cargo Passenger and Cargo
Packing Instructions: Y644 Maximum Qty/Pack: 25 kg
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: 669 Maximum Qty/Pack: 1 kg
Shipping Name: CARBAMATE PESTICIDE, SOLID, TOXIC *(CONTAINS
3-KETOCARBOFURAN)

Maritime Transport IMDG:
IMDG Class: 6.1 IMDG Subrisk: None
UN Number: 2757 Packing Group: II
EMS Number: F-A,S-A Special provisions: 61 274
Limited Quantities: 500 g Marine Pollutant: Yes
Shipping Name: CARBAMATE PESTICIDE, SOLID, TOXIC(contains 3-ketocarbofuran)

Section 15 - REGULATORY INFORMATION

3-ketocarbofuran (CAS: 16709-30-1) is found on the following regulatory lists;
"US - Maine Chemicals of High Concern List","US - Washington Class A toxic air pollutants: Known and Probable Carcinogens"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Skin contact may produce health damage*.
■ Inhalation may produce serious health damage*.
■ Cumulative effects may result following exposure*.
■ May produce discomfort of the eyes*.
* (limited evidence).

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■ Classification of the preparation 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.

■ 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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