SZABO SCANDIC

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Produktinformation

- Forschungsprodukte & Biochemikalien
- Zellkultur & Verbrauchsmaterial
- Diagnostik & molekulare Diagnostik
- Laborgeräte & Service

Weitere Information auf den folgenden Seiten!
See the following pages for more information!

Lieferung & Zahlungsart

siehe unsere Liefer- und Versandbedingungen

Zuschläge

- Mindermengenzuschlag
- Trockeneiszuschlag
- Gefahrgutzuschlag
- Expressversand

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BCIP/NBT Stock Solution, 50X

sc-24981

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
BCIP/NBT Stock Solution, 50X

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

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	1		
Toxicity:	2		
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 - May cause lung damage if swallowed.
Irritating to eyes, respiratory system and skin.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result. (ICSC13733).
■ Accidental ingestion of the material may be damaging to the health of the individual.
■ DMSO has shows very few toxic symptoms in humans.
The most common are nausea, skin rashes and an unusual garlic-onion-oyster smell on body and breath.

EYE

■ Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals.
Prolonged eye contact may cause inflammation characterized by a temporary redness of the conjunctiva (similar to windburn).
■ Direct contact with aqueous solutions containing 75-90% DMSO produce irritation with temporary stinging and burning.
Lower concentrations do not appear to cause injury and are tolerated well.

SKIN

■ The material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time.
Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.
■ Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
■ Stinging and burning of the skin as well as rashes and vesicles have been seen.
A heat reaction may occur if applied to wet skin Absorption through the skin may produce a garlic-like odour on the breath as a result of conversion within the body to mercaptans.
■ 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 can cause respiratory irritation in some persons.
The body's response to such irritation can cause further lung damage.
■ Inhalation hazard is increased at higher temperatures.
■ Inhalation of aerosols/ vapours of may result in coughing or burning sensation.
High concentrations may produce systemic effects such as nausea, vomiting, chills, cramps, headache, dizziness, and lethargy.

CHRONIC HEALTH EFFECTS

■ Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.
There is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.
When 90 ml of 90% DMSO were applied to the entire trunk of 20 men daily for 6 months, bad breath, transient erythema, burning and stinging were apparent. Dermatitis, accompanied by moderate inflammation, regressed as treatment continued. Continuous applications under an occluding membrane produced hardening of the skin within a month.
Crystalline lens alterations, resembling juvenile nuclear sclerosis, has been produced in test animals, but not in man, following chronic dermal exposure.
Rabbits exposed to DMSO mists for 5 months developed chemical pneumonia, cloudy swelling of the liver and signs of renal toxicity.
Reproductive effects have been reported in animals.
There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
dimethyl sulfoxide	67-68-5	60-70
p-nitrotetrazolium blue	298-83-9	1-5

5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt	6578-06-9	0.1-<1

Section 4 - FIRST AID MEASURES

SWALLOWED
· If swallowed do NOT induce vomiting. · If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. · If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

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.

SKIN
■ If skin contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).

INHALED
· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN
■ Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically.
Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not Available
Upper Explosive Limit (%):	29
Specific Gravity (water=1):	Not Available
Lower Explosive Limit (%):	2.5

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.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
· Combustible.
· Slight fire hazard when exposed to heat or flame.
Combustion products include: carbon dioxide (CO2), sulfur oxides (SOx), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.
May emit corrosive 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:
Safety Glasses.
Chemical goggles.
Gloves:
1.NEOPRENE 2.NEOPRENE/NATURAL
Respirator:
Type A Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
· Remove all ignition sources.
· Clean up all spills immediately.
MAJOR SPILLS
■ Moderate hazard.
· 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

· DO NOT allow clothing wet with material to stay in contact with skin.
· Avoid all personal contact, including inhalation.
· Wear protective clothing when risk of exposure occurs.

RECOMMENDED STORAGE METHODS

■ Glass container.
· Metal can or drum
· Packing as recommended by manufacturer.

STORAGE REQUIREMENTS

· Store in original containers.
· Keep containers securely sealed.
· No smoking, naked lights or ignition sources.
· 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

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
US AIHA Workplace Environmental Exposure Levels (WEELs)	dimethyl sulfoxide (Dimethyl Sulfoxide)	250							
Canada - British Columbia Occupational Exposure Limits	p-nitrotetrazolium blue (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))		10 (N)						
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	p-nitrotetrazolium blue (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction)		5						
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	p-nitrotetrazolium blue (Particulates not otherwise regulated Respirable fraction)		5						
US - California Permissible Exposure Limits for Chemical Contaminants	p-nitrotetrazolium blue (Particulates not otherwise regulated Respirable fraction)		5						(n)
US - Oregon Permissible Exposure Limits (Z-1)	p-nitrotetrazolium blue (Particulates not otherwise regulated (PNOR) (f) Total Dust)	-	10						Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are

						different than the federal Limits. PNOR means “particles not otherwise regulated.”
US - Michigan Exposure Limits for Air Contaminants	p-nitrotetrazolium blue (Particulates not otherwise regulated, Respirable dust)		5			
Canada - Prince Edward Island Occupational Exposure Limits	p-nitrotetrazolium blue (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)		10			See Appendix B current TLV/BEI Book
US - Oregon Permissible Exposure Limits (Z-1)	p-nitrotetrazolium blue (Particulates not otherwise regulated (PNOR) (f) Respirable Fraction)	-	5			Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.”
Canada - Alberta Occupational Exposure Limits	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2	8.8			
Canada - British Columbia Occupational Exposure Limits	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2				Skin
US ACGIH Threshold Limit Values (TLV)	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2				TLV Basis: methemoglobinemia; BEI-M
US - Minnesota Permissible Exposure Limits (PELs)	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2	9			
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2	9			
US - California Permissible Exposure Limits for Chemical Contaminants	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2	9			
US - Tennessee Occupational Exposure Limits - Limits For Air	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2	9			

Contaminants						
US - Hawaii Air Contaminant Limits	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2	9			
US - Washington Permissible exposure limits of air contaminants	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2.0		4		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2		4		Skin, T20
US - Alaska Limits for Air Contaminants	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2	9			
Canada - Prince Edward Island Occupational Exposure Limits	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2				TLV Basis: methemoglobinemia; BEI-M
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2	8.8			
US - Michigan Exposure Limits for Air Contaminants	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2	9			
Canada - Nova Scotia Occupational Exposure Limits	5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (p-Toluidine)	2				TLV Basis: methemoglobinemia; BEI-M

ENDOELTABLE

PERSONAL PROTECTION




RESPIRATOR

Type A Filter of sufficient capacity
Consult your EHS staff for recommendations

EYE

· Safety glasses with side shields.

· Chemical goggles.

HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.

NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

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.

· Aprotic solvents may greatly promote the toxic properties of solutes because of their unique ability to penetrate synthetic rubber protective gloves and the skin (butyl rubber gloves are reported to be more satisfactory than others.

· Neoprene gloves.

OTHER

· Overalls.

· P.V.C. apron.

· Barrier cream.

· Skin cleansing cream.

· Eye wash unit.

ENGINEERING CONTROLS

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.

State	Liquid	Molecular Weight	Not Applicable
Melting Range (°F)	Not Available	Viscosity	Not Available
Boiling Range (°F)	Not Available	Solubility in water (g/L)	Not Available
Flash Point (°F)	203	pH (1% solution)	Not Available
Decomposition Temp (°F)	Not Available	pH (as supplied)	6.7
Autoignition Temp (°F)	Not Available	Vapour Pressure (mmHG)	Not Available
Upper Explosive Limit (%)	29	Specific Gravity (water=1)	Not Available
Lower Explosive Limit (%)	2.5	Relative Vapor Density (air=1)	Not Available
Volatile Component (%vol)	Not Available	Evaporation Rate	Not Available

APPEARANCE

Liquid.

DMSO is a liquid (density 1.1) with no color but in some cases a light characteristic sulfur odor due to traces of the raw material dimethyl sulfide. DMSO has a melting point of 18.5 C and a boiling point of 189 C (at 1,013 hPa). Its log Kow is of –1.35 (measured). DMSO has a vapor pressure of 0.81 hPa at 25 C and a Henry law's constant of 1.17 10+5 mol.kg-1.atm-1. DMSO is miscible in all proportion with water and with most of the common organic solvents such as alcohols, esters, ketones, ethers, chlorinated solvents and aromatics. DMSO is stable in water and is not expected to volatilize. DMSO Log Koc is estimated to be equal to 0.64. This value suggests that DMSO is mobile in soil. DMSO is not expected to adsorb to suspended solids, sediments and soils. In atmosphere, DMSO is not susceptible to direct photolysis by sunlight. Calculations indicate DMSO half-life values, for reaction with OH radicals, from ca 2 to 6 h The LC50 (96 hrs.) for ten species of fish range from 32,500 to 43,000 ppm. The LC50 for two species of protozoans are 32,000 and 38,000 ppm. The concentration required to inhibit growth (EC50) for five species of blue-green algae and one green algae species ranged from 0.4 to 4.0%. DMSO is non-bio-accumulating since the log of the octanol/water partition coefficient (log Kow) is -2.03.

Material	Value

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

· Presence of incompatible materials.
· Product is considered stable.

STORAGE INCOMPATIBILITY

· Many aprotic (non-hydroxylic) solvents are not inert towards other reagents and care must be taken when using untried combinations of solvents an reagents for the first time.
· Some aprotic solvents have a dramatic effect on reaction rates.
Dimethyl sulfoxide:
· reacts violently or explosively with oxidisers, acryl halides, aryl halides and related compounds, non-metallic chlorides and other active halogen compounds, p-bromobenzoyl acetanilide, diborane, boron compounds, iodine pentafluoride, magnesium perchlorate, methyl bromide, perchloric acid, periodic acid, silver fluoride, sodium hydride, potassium permanganate
· forms powerfully explosive mixtures with metal salts of oxoacids
All blends containing DMSO must be buffered at pH 7-9 before distillation.
Prolonged heating above 15 deg.C (302 deg. F) can cause rapid,exothermic decomposition.
· Sulfoxide ion may react violently or explosively with acyl halides, non-metal halides, benzenesulfonyl halides, cyanuric halides, oxalyl phosphorus trihalides, phosphorus oxyhalides, sulfuryl halides and thionyl halides.
These violent reactions may occur as a result of exothermic polymerization of formaldehyde produced by the interaction of the sulfoxide with reactive halides, and acidic or basic reagents.
Avoid reaction with oxidizing agents.

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

Section 11 - TOXICOLOGICAL INFORMATION

Roche Diagnostics NBT/BCIP Stock Solution

TOXICITY AND IRRITATION

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

P-NITROTETRAZOLIUM BLUE:

5-BROMO-4-CHLORO-3-INDOLYL PHOSPHATE P-TOLUIDINE SALT:

ROCHE DIAGNOSTICS NBT/BCIP STOCK SOLUTION:

■ No significant acute toxicological data identified in literature search.

DIMETHYL SULFOXIDE:

ROCHE DIAGNOSTICS NBT/BCIP STOCK SOLUTION:

■ The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.
■ The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
■ A subchronic rat inhalation study established a NOEL at 200 mg/m3 (0.2 mg/l), the only concentration tested. Extensive monitoring of human patients have shown that DMSO does not affect human renal function. DMSO is a diuretic but no sign of kidney damage has been found in humans or laboratory nimals after repeated DMSO treatment.
The US Public Health Services concluded that DMSO was not a carcinogen and is a safe carrying agent analogous to mineral oil. An 18-month study with rhesus monkeys established an oral NOEL of 3 g/kg/day. No tumors were observed and bone marrow smears from the monkeys that received oral or topical doses of DMSO at up to 9 g/kg/day for 18 months showed no DMSO effects. A 78-week rat study revealed no increases in mortality or tumors and established an oral NOEL of 3.3 g/ kg/day based on hematology and ocular effects. If one considers the rhesus monkey to be the most appropriate model for extrapolation to humans, the oral monkey NOEL of 3 g/kg/day is comparable to an average human (70 kg) consuming approximately 210 g DMSO per day. Continuing research has demonstrated that the ocular effects reported from DMSO treatment of dogs, rabbits, guinea pigs and swine are species-specific and not reproducible in primates, including humans.
Eighty-four humans who received daily topical treatment of 2.6 g DMSO/kg/day for up to 3 months showed no DMSO-related effects beyond occasional skin irritation and garlicky breath and body odor. DMSO is metabolised in humans by oxidation to DMSO2 or by reduction to DMS (dimethylsulfide). DMSO and DMSO2 (dimethylsulfone) are excreted in the urine and feces. DMS is eliminated through the breath and skin with a characteristic garlicky or oyster-like odor. Human excretion of orally administered DMSO is complete within 120 hours, with up to 68 percent as unchanged DMSO and 21-23 percent as DMSO2 excreted in the urine. The rate of renal clearance has been shown to be similar for chronic and singly administered doses regardless of dose concentration. No residual accumulation of DMSO has been reported in humans or lower animals who have received DMSO treatment for protracted periods of time, regardless of route of dose administration. The metabolites of DMSO are DMSO2, which is naturally-occurring at low levels in human urine, and DMS, which is naturally-occurring in plants, the atmosphere, and lakes and oceans. Both of these metabolites are readily excreted from the body. Based on their widespread natural occurrence and ready degradation and/or excretion, the production of these metabolites is not

expected to pose any toxicological concern.
DMSO is not considered to be an endocrine disruptor. DMSO is found naturally in the environment, in natural waters and in most foods and feeds. Studies have shown that DMSO applied to plants is metabolised and incorporated into amino acids and other sulfur-containing plant components. Animal and human metabolism studies have shown that DMSO is predominantly eliminated ``as is'' or metabolised to DMSO2 and DMS prior to elimination. Several studies in which different species (i.e. rat, mouse, rabbit, hamster) were administered DMSO at high levels (up to lethal levels) have shown no effect on the time-to-mating or on mating and fertility indices.
DMSO is not mutagenic to Salmonella, Drosophila, and fish cell cultures. Because DMSO is not considered to be mutagenic, it is widely used as a solvent in mutagenicity testing. Although DMSO is bacteriostatic or bactericidal at concentrations of 5-50 percent, there is no evidence that DMSO causes chromosomal aberrations at levels that are not directly toxic to cells. In vivo cytogenetic studies with primates receiving orally or dermally administered DMSO showed no abnormalities in bone marrow smears. There are no documented adverse genetic effects reported as a result of medicinal DMSO uses (including quasi-medicinal uses for treatment of arthritis or sprains and strains). Additionally, no adverse genetic effects have been reported from occupational exposure to DMSO in over 40 years of industrial use.
Reproductive and developmental toxicity. A mouse teratology NOEL of 12 g/kg/day has been established based on research with a 50 percent DMSO solution administered orally. Additional teratogenicity studies of orally administered DMSO to pregnant mice, rats, rabbits and guinea pigs have demonstrated that DMSO is not a teratogen in mammals except at high levels that cause overt maternal toxicity and are coincident with the maximum tolerated dose. The data suggest that DMSO is not teratogenic at low levels regardless of the route of administration. Finally, the teratogenic potential of DMSO is dependent on the route of administration, the dose level and gestation stage at exposure.

- **For dimethyl sulfoxide (DMSO):**

No data is available on the absorption of DMSO by inhalation exposure. However, its physico-chemical properties (low molecular size, high polarity and water solubility) suggest that DMSO is significantly absorbed by the inhalation route. DMSO appears to be readily absorbed through the skin. An in vitro permeability rate of 176 g/m2.hour has been reported for human skin. Maximal serum concentration of DMSO occurred at 4 to 8 hours following skin contact in humans, and at 2 hours in rats. DMSO is also well absorbed after oral exposure. Peak plasma concentration of DMSO was attained at 4 hours after oral dosing in humans and at 0.5 hours in rats. DMSO is widely distributed to all body tissues. Higher concentrations of DMSO were found in the kidney, spleen, lung, heart and testes of rats given an oral dose, while higher levels were noted in the spleen, liver and lungs following a dermal dose. In humans, the plasma DMSO clearance half-life was about 11 to 14 hours, and 20 hours after dermal and oral dosing, respectively. A shorter clearance half-life of 6 hours was observed in rats after both routes of exposure. Metabolism of DMSO takes place primarily in the liver and kidneys. The principal metabolite is dimethyl sulfone (DMSO2). Peak plasma levels of DMSO2 in humans were observed at 72 to 96 hours after dosing, and then declined with a half-life of about 60 to 72 hours. DMSO is excreted unchanged or as the metabolite DMSO2 in the urine. In the human, about 13 and 18% of a dermal dose, and 51% and 10% of an oral dose were accounted for by urinary excretion of DMSO and DMSO2, respectively.
DMSO is of low acute toxicity. In non-guideline studies, LD50 in rats are generally higher than 20,000 mg/kg bw and 40,000 mg/kg bw by the oral and dermal routes, respectively. In an acute inhalation study performed following the OECD TG 403, the LC50 in rats was higher than 5,000 mg/m3 for a 4-hour exposure.
A skin irritation assay performed in rabbit according to the OECD TG 404 revealed no more than a very slight or well-defined erythema, which disappeared in 3 days. In humans, repeated application of DMSO solution for up to several months could induce transient erythema, burning, stinging and itching, which returned to normal after discontinuation of treatment. In one study in humans, occlusive exposure to DMSO caused cell death of the outer epidermis, followed by rapid regeneration.
DMSO is slightly irritating for the eye. In studies performed following the OECD TG 405 or the EEC method B.5, a slight to moderate conjunctival irritation, which cleared in 3 days, was observed in the eyes of rabbits. A repeated instillation (100% DMSO, 3 times/day for 6 months) in the eyes of rabbits induced only a temporary lacrimation but did not show any changes in the iris, cornea, lens, retina, conjunctiva and lids. In humans, the instillation of solutions containing 50 to 100% DMSO has caused transient sensation of burning which was reversible within 24 hours.
DMSO is not a skin sensitiser. Sensitisation tests performed in guinea pigs and mice following methods comparable to the OECD TG 406 were uniformly negative. A skin sensitization assay performed in humans was also negative.
Repeat dose toxicity: DMSO is of low toxicity by repeated administration. According to the results of a 13-week inhalation toxicity study compliant with the OECD TG 413, the No Adverse Effects Concentration (NOAEC) for DMSO could be established at ca. 1,000 mg/m3 for respiratory tract irritation and ca. 2,800 mg/m3 (the highest concentration tested) for systemic toxicity. Other non-guideline repeated dose toxicity studies performed by different routes of administration and with several mammalian species have also shown that DMSO produced only slight systemic toxicity. With the exception of a decrease of the body weight gain and some hematological effects (which could be secondary to an increased diuresis) at very high dose levels, the most common finding observed in these studies is changes of the refractive power of the lens. These ocular changes were observed following repeated oral application of DMSO at doses of around 3,000 mg/kg bw/d in rats for 18 months and 1,000 mg/kg bw/d in dogs for 2 years. Following repeated dermal application, the same effects were observed at doses of around 1,000 mg/kg bw/d in rabbits for 30 days, in dogs for 118 days and in pigs for 18 weeks. Similar ocular changes were not observed in monkeys following dermal application at doses of up to 9,000 mg/kg bw/d for 18 months (dose levels that caused marked ocular toxicity in sensitive species). Clinical signs of systemic toxicity and the alterations of the lens were also never observed or reported in clinical and epidemiological studies performed in humans, even after exposure to a high dose level (1,000 mg/kg/d for 3 months) or for a long period of time (up to 19 months). Overall, primates appear to be much less sensitive to DMSO ocular toxicity, and the ocular changes observed in rats, rabbits, dogs or pigs are not considered relevant for human health. Then, it is possible to estimate that the No Observed Adverse Effect Levels (NOAELs) by oral or dermal routes would be close to 1,000 mg/kg bw/d.
In studies performed with methods compliant or comparable to OECD guidelines, no genotoxic activity was observed for Genetic toxicity: DMSO in gene mutation assays in Salmonella typhimurium, an in vitro cytogenetics assay in CHO cells and an in vivo micronucleus assay in rats. With few exceptions, a large battery of additional in vitro and in vivo non-guideline studies confirmed the lack of genotoxic potential.
Reproductive and developmental toxicity: DMSO is not a reproductive toxicant. In a Reproduction/Developmental Toxicity Screening Test performed following the OECD TG 421, the NOAEL for parental toxicity, reproductive performance (mating and fertility) and toxic effects on the progeny was considered to be 1,000 mg/kg/day. In addition, no effect was observed on the estrus cycle, the sperm parameters (count, motility and morphology) and the reproductive organs of male and female rats after a 90-day inhalation exposure to DMSO

concentrations up to 2,800 mg/m3. In developmental toxicity studies performed according to the OECD TG 414, oral administration of DMSO to pregnant female rats or rabbits during the period of organogenesis was not teratogenic. The NOAELs for maternal toxicity were 1,000 and 300 mg/kg bw/d in rats and rabbits, respectively, and the NOAELs for embryo/foetotoxicity were 1,000 mg/kg bw/d in both species.

CARCINOGEN

BROMINE COMPOUNDS (ORGANIC OR INORGANIC)	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65-MC

Section 12 - ECOLOGICAL INFORMATION

No data

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
dimethyl sulfoxide	HIGH		LOW	HIGH
p-nitrotetrazolium blue	HIGH		LOW	LOW

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
¦ 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. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. 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.
In the absence of dissolved oxygen and in the presence of bacteria, a small amount of DMSO can be reduced to DMS (dimethyl sulfide), which produces a nauseating odour at very small concentrations.
These specific conditions occur mainly with DMSO effluents in poorly aerated, non sterile storage tanks or in biological waste treatment plant.
· With spot quantity of DMSO effluents in drums or storage tank, odour can be prevented or eliminated with 0,3% concentration of castor oil based formulation.
· In biological water treatment plant, DMS formation can be inhibited with less than 5 ppm of nitrates such as KNO3. NB: nitrate concentration are permitted by European standards up to 50 ppm in both waste water and drinking water.
· If hydrogen peroxide is already used, with a molar recommended ratio H202/DMSO of 2, oxidation of DMSO leads to stable DMSO2 (dimethyl sulfone).
· Recycle wherever possible or consult manufacturer for recycling options.
· Consult Waste Management Authority for disposal.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 - REGULATORY INFORMATION

Regulations for ingredients

dimethyl sulfoxide (CAS: 67-68-5) is found on the following regulatory lists;

"Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","International Council of Chemical Associations (ICCA) - High Production Volume List","International Fragrance Association (IFRA) Survey: Transparency List","OECD Representative List of High Production Volume (HPV) Chemicals","US AIHA Workplace Environmental Exposure Levels (WEELs)","US DOE Temporary Emergency Exposure Limits (TEELs)","US EPA High Production Volume Program Chemical List","US Toxic Substances Control Act (TSCA) - Inventory"

p-nitrotetrazolium blue (CAS: 298-83-9) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)","US Toxic Substances Control Act (TSCA) - Inventory"

5-bromo-4-chloro-3-indolyl phosphate p-toluidine salt (CAS: 6578-06-9) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)","US Toxic Substances Control Act (TSCA) - Inventory"

No data for Roche Diagnostics NBT/BCIP Stock Solution (CW: 3256810)

Section 16 - OTHER INFORMATION

ND

Substance CAS Suggested codes dimethyl sulfoxide 67- 68- 5 Mut3; R68 5- bromo- 4- chloro- 3- indolyl 6578- 06- 9 R52/53 phosphate p- toluidine salt

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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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