SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product Identifier — TourPlex Microtrace

1.2. Relevant identified uses of the substance or mixture and uses advised against
Relevant uses: Use as a professional use fertiliser.

1.3. Details of the supplier of the safety data sheet
Company: Tour Best LLC, P.O. Box 127414, Dubai, UAE.
Phone: +971 (0) 50 344 1381
Email: golf@tourbest.ae

1.4. Emergency telephone number — +44 (0) 7725 962 366

SECTION 2: Hazards Identification

2.1. Classification of the substance or mixture
CLASSIFICATION according to Directive EC 1272/2008 Classification, Labelling and Packaging

Acute Tox. 4:	H302: Harmful if swallowed.
Skin Irrit. 2:	H315: Causes skin irritation.
Eye Dam. 1:	H318: Causes serious eye damage.
STOT Rep 2:	H373: May cause damage to organs through prolonged or repeated exposure.
Aquatic Ac. 1:	H400: Very toxic to aquatic life
Aquatic Chr. 1:	H410: Very toxic to aquatic life with long lasting effects

CLASSIFICATION according to Directive 1999/45/EC and statutory instrument No.716 2009 Chemicals (Hazard Information and Packaging)

Xn; R22:	Harmful if swallowed.
Xi; R36/38:	Irritating to eyes and skin.
Xn; R48/20/22:	Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed
N; R50/53:	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Primary Hazard: Harmful if swallowed. Causes skin irritation. Causes serious eye damage. May cause damage to organs through prolonged or repeated exposure.

2.2. Label elements
Contains: Iron sulphate E.C. 231-753-5, Manganese sulphate E.C. 232-089-9, Copper sulphate E.C. 231-847-6, Zinc sulphate E.C. 231-793-3

Signal word: Danger

Hazard Statements:
H302: Harmful if swallowed.
H315: Causes skin irritation.
H318: Causes serious eye damage.
H373: May cause damage to organs through prolonged or repeated exposure.
H410: Very toxic to aquatic life with long lasting effects.

Precautionary Statements
P260: Do not breathe mist/vapours/spray.
P280: Wear protective gloves/eye protection.
P302+P352: IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove Contact lenses, if present and easy to do. Continue rinsing.

P310: Immediately call a POISON Center or doctor/physician.
P391: Collect spillage
P501: Dispose of contents/container in accordance with local/national regulations.

2.3. Other hazards
Mixture not classed as PBT or vPvB.

SECTION 3: Composition/Information on Ingredients
Hazardous components:

Identification	Chemical Name/Classification		Concentration
CAS: 7720-78-7 EC: 231-753-5 INDEX: 026-003-00-7 REACH: 01-2119513203-57	Iron Sulphate		15.0-25.0%
	Directive 67/548/EC	R22, R36/38	
	Regulation 1272/2008	Acute tox. 4, H302; Skin irrit. 2, H315; Eye Irrit. 2, H319	
CAS: 10034-96-5 EC: 232-089-9 INDEX: 025-003-00-4 REACH: 01-2119456624-35	Manganese Sulphate		10.0-20.0%
	Directive 67/548/EC	R48/20/22; R51/53	
	Regulation 1272/2008	Eye Dam. 1 – H318; STOT Rep. 2, H373; Aqu. Tox. chron. 2, H411	
CAS: 7758-99-8 EC: 231-847-6 INDEX: 029-004-00-0 REACH: 01-2119520566-40	Copper sulphate pentahydrate		5.0-10.0%
	Directive 67/548/EC	R22; R36/38; R50/53	
	Regulation 1272/2008	Acute Tox. 4 - H302; Skin Irrit. 2 -H315; Eye Irrit. 2 -H319; Aquatic Acute 1 – H400; Aquatic Chronic 1 – H410; M-factor: 10	
CAS: 77-92-9 EC: 201-069-1 REACH: 01-2119457026-42	Citric Acid		<5.0%
	Directive 67/548/EC	R36	
	Regulation 1272/2008	Eye Irrit. 2, H319	
CAS: 7446-19-7 EC: 231-793-3 INDEX: 030-006-00-9 REACH: 01-2119474684-27	Zinc sulphate monohydrate		<5.0%
	Directive 67/548/EC	R22, R41, R50/53	
	Regulation 1272/2008	Acute Tox. 4 - H302; Eye Dam. 1 – H318; Aquatic acute 1 - H400; Aquatic chronic 1 -H410	
CAS: 12280-03-4 EC: 234-541-0 REACH: 01-2119490860-33	Disodium octaborate tetrahydrate		<2.5%
	Directive 67/548/EC	R60-61	
	Regulation 1272/2008	Repr. 1B H360FD	

The full text and symbols for all hazard information if not displayed in section 2 or 3 are displayed in Section 16

SECTION 4: First-Aid Measures

4.1. Description of first aid measures

By inhalation: Remove from source of exposure to fresh air; seek medical attention.

By skin contact: Drench immediately with water. Remove any contaminated clothing and launder before re-use. Seek medical attention if symptoms persist or develop.

By eye contact: Rinse cautiously for several minutes, Remove contact lenses, if present and easy to do, rinse with clean water for 15 minutes. Seek medical attention IMMEDIATELY.

By consumption: Do not induce vomiting. Wash out mouth with water and give water to drink. Obtain medical attention IMMEDIATELY.

4.2. Most important symptoms and effects, both acute and delayed
Harmful if swallowed. Causes skin irritation. Causes serious eye damage. May cause damage to organs through prolonged or repeated exposure.

4.3. Indication of any immediate medical attention and special treatment needed
Information not available

SECTION 5: Fire-Fighting Measures

5.1. Extinguishing media
Use Foam, carbon dioxide, dry powder, sand. The mixture is not classified as flammable as such extinguishing media should be chosen as appropriate for surrounding materials.

5.2. Special hazards arising from the substance or mixture
Possible irritant fumes arising from combustion.

5.3. Advice for fire-fighters
Cool down containers/equipment exposed to heat with a water spray. Contain spread of extinguishing fluids (these fluids may be hazardous for the environment). Wear complete protective clothing and self-contained breathing apparatus.

SECTION 6: Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures
The following precautions are considered to be good practice when using any chemicals irrespective of their classification unless otherwise specified.

Use personal protective equipment: appropriate coveralls and gloves
eye/face protection
appropriate respirator
Avoid contact with skin and eyes

6.2. Environmental precautions
Do not allow to enter storm drains or water courses. If this product enters a water course or a sewer (including via contaminated soil & vegetation) in large quantities contact local water authority and inform the Environment Agency.

6.3. Methods and material for containment and cleaning up
Sweep avoiding generating dust into labelled containers for recovery or contact specialist waste disposal contractor.

6.4. Reference to other sections
No reference necessary.

SECTION 7: Handling and Storage

7.1. Precautions for safe handling
Avoid contact with skin and eyes. Wash Hands thoroughly after handling
Do not eat, drink or smoke when using this product. remove contaminated clothing and protective equipment before entering eating areas.

7.2. Conditions for safe storage, including any incompatibilities
Store in a cool dry atmosphere, in original labelled containers. Refer to manufacturer for maximum safe stacking height. Keep away from heat sources, combustible materials.

7.3. Specific end use(s)
No specific information available.

SECTION 8: Exposure Controls/Personal Protection

8.1. Control parameters
Exposure limit values have not been determined for this mixture

Substance	CAS Number	Workplace Exposure Limit				Comments
		Long-term exposure limit (8-hr TWA reference period)		Short-term exposure limit (15 minute reference period)		The Carc, Sen and Sk notations are not exhaustive. Notations have been applied to the substances identified in IOELV Directives*
		ppm	$mg.m^{-3}$	ppm	$mg.m^{-3}$	
Manganese and its inorganic compounds (Mn)	-	-	0.5	-	-	-
Iron salts (as Fe)	-	-	1.0	-	2.0	-

*IOELV – Indicative Occupational Exposure Limit Values (IOLEV).
Sk Can be absorbed through the skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity.

Iron Sulphate:
DNELs:

Worker		Consumer	
Acute systemic effects, dermal	$FeSO_4.7H_2O$ 2.8 mg/Kg/d	Acute systemic effects, oral	$FeSO_4.7H_2O$ 1.4 mg/Kg/d
Acute systemic effects, inhalative	$FeSO_4.7H_2O$ 9.9 mg/m^3	Acute systemic effects, dermal	$FeSO_4.7H_2O$ 1.4 mg/Kg/d
Acute systemic effects, dermal	$FeSO_4.7H_2O$ 2.8 mg/Kg/d	Acute systemic effects, inhalative	$FeSO_4.7H_2O$ 2.5 mg/m^3
Acute systemic effects, inhalative	$FeSO_4.7H_2O$ 9.9 mg/m^3	Acute systemic effects, oral	$FeSO_4.7H_2O$ 1.4 mg/Kg/d
		Acute systemic effects, dermal	$FeSO_4.7H_2O$ 1.4 mg/Kg/d
		Acute systemic effects, inhalative	$FeSO_4.7H_2O$ 2.5 mg/m^3

PNECs: PNECs given were derived based on the concentration which would cause a 10% increase above typical natural background levels of iron in soil in sediment. Thus the respective PNEC is equal to 110% of the typical natural background level of iron.

Water: Iron is an essential trace element for fish, aquatic invertebrates and plants. A direct toxicity could not be demonstrated in tests. Therefore no PNEC was derived.

Sewage treatment plants (STP): PNEC STP Fe: 500 mg/l; $FeSO_4.7H_2O$ 2483 mg/l

Sediment: PNEC Sediment (freshwater): Fe 49.5 g/Kg; $FeSO_4.7H_2O$: 246 g/Kg dry weight
PNEC Sediment (marine): Fe 49.5 g/Kg; $FeSO_4.7H_2O$: 246 g/Kg dry weight

Soil: PNEC soil: Fe: 55.5 g/Kg; $FeSO_4.7H_2O$: 276 g/Kg dry weight

Oral: Iron is an essential trace element for fish, aquatic invertebrates and plants. A direct toxicity could not be demonstrated in tests. Therefore no PNEC was derived.

Manganese sulphate:
DNEL:

	Industry		Consumer	
Dermal	Long Term	4.14 µg/Kg/day	Long Term	2.1 µg/Kg/day
Inhalation	Long Term	0.2 mg/m^3	Long Term	0.043 mg/m^3

DNELs for the oral route, all "acute effects" and for "long-term local-effects" were not calculated and are not required for the "identified uses" covered in this SDS and the Chemical Safety Report (CSR).

PNEC:

Freshwater	0.0128 mg/l	Marinewater	0.4 µg/l
Sediment (Freshwater)	11.4 µg/kg	Sediment (Marinewater)	1.4 µg/kg
Soil	25.1 mg/kg	STP	56 mg/l
Spills(freshwater)	30 µg/l		

Soil & sediment PNEC values are mg/kg wet weight.

Copper Sulphate:
DNEL:

Oral	Long Term	Systemic Effects	0.041 mg/kg/day
Oral	Short Term	Systemic Effects	0.082 mg/kg/day
Inhalation	Long Term	Local Effects	(*)= 1 mg/m^3
Inhalation	Long Term	Local Effects	(**) = 0.01 mg/m^3
Dermal	Long Term	Local Effects	(***)136.67 mg/kg/day
Dermal	Long Term	Local Effects	(****)13.67 mg/kg/day

(*)Dust. (**)Fume. (***)Powder. (****)Liquid.

Citric acid:
PNEC:

Aquatic PNECaqua – freshwater (mg/l):	0.44	
PNECaqua – marine water (mg/l):	0.044	
PNECfreshwater-sediment (mg/kg d.w.)	3.46	(Equivalent to 0.752 mg/kg wwt)
The PNECmarine-sediment (mg/kg d.w.)	34.6	(Equivalent to 7.52 mg/kg wwt)
Terrestrial (PNECsoil mg/kg d.w.)	33.1	
Sewage treatment plant PNEC STP (mg/l)	>1000	
Atmospheric Compartment Not applicable		

Zinc sulphate:
DNEL:

Industry	Inhalation	Long Term	Systemic Effects	1 mg/m^3
Industry	Dermal	Long Term	Systemic Effects	0.83 mg/Kg/day
Consumer	Oral	Long Term	Systemic Effects	0.83 mg/Kg/day
Professional	Inhalation	Long Term	Systemic Effects	1.3 mg/m^3
Consumer	Dermal	Long Term	Systemic Effects	0.83 mg/Kg/day

The units are expressed in 'mg/µg' of: Zinc.

PNEC:

Freshwater	0.0206 mg/l	Marine water	0.0061 mg/l
Sediment (freshwater)	235.6* mg/Kg	Sediment (Marine water)	113* mg/Kg
Soil	106.8** mg/Kg	STP	0.0052*** mg/l

The units are expressed in 'mg/µg' of: Zinc. These PNECs are added value PNECs- they are to be added to the natural background levels of: Zinc. - in the appropriate compartments (e.g. soils, sediments).
(*) A generic bioavailability factor of 0.5 is applied by default, according to the EU risk assessment (ECB 2008).
(**) by default this value was multiplied by '3' to take into account "lab-to-field" differences in toxicity. (STP) The PNEC for STP was derived by applying an assessment factor to the lowest relevant toxicity value (5.2mg Zn/L). (Dutka et al., 1983)

Disodium octaborate tetrahydrate
DNEL – Workers:

Worker	Inhalation	Long Term	Systemic Effects	6.92 mg/m3 or 1.45 mg B/m3
Worker	Dermal	Long Term	Systemic Effects	22901 mg/day or 4800 mg B/day

DNEL - General population:

Oral	Long Term	Systemic Effects	0.81 mg/kg or 0.17 mg B/kg body weight/day
Inhalation	Long Term	Systemic Effects	3.48 mg/m3 or 0.73 mg B/m3
Dermal	Long Term	Systemic Effects	164 mg/kg body weight /day or 34.3 mg B/kg body weight /day
Oral	Long Term	Local Effects	12 mg/m3 or 2.52mg B/m3

PNEC:

Water:	1.35 mg B/L (freshwater and marine water)
	9.1 mg B/L (water with intermittent releases).
Sediment:	1.8 mg B/kg (dry sediment of freshwater and marine sediment).
Soil:	5.4 mg B/kg soil body weight
STP (sewage treatment plant):	1.75 mg B/L

8.2. Exposure controls
Goggles – Eye Protection: goggles/face shield to BS EN166
Gloves – BS EN374 – chemical protection
Respirators – BS approved protection device with P3 filter

SECTION 9: Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Appearance:	Off-white solid
Odour:	Information not specified
pH:	Information not specified
Melting point/freezing:	Information not specified
Flammability (solid, gas):	Information not specified
Specific gravity:	Information not specified

9.2. Other information
No other relevant information available.

SECTION 10: Stability and Reactivity

10.1. Reactivity
Unknown.

10.2. Chemical stability
Stable under normal conditions of use.

10.3. Possibility of hazardous reactions
Information not available.

10.4. Conditions to avoid
Extremes of temperature.

10.5. Incompatible materials
None known.

10.6. Hazardous decomposition products
Possible Irritant fumes.

SECTION 11: Toxicological Information

11.1. Information on toxicological effects
The mixture has not been assessed for toxicological effects, the mixture classification is given in section 2 based on individual component contents. Individual component hazards are given in section 3

Toxicological information on hazardous ingredients:

Iron Sulphate:
DNELs:

Worker		Consumer	
Acute systemic effects, dermal	$FeSO_4.7H_2O$ 2.8 mg/Kg/d	Acute systemic effects, oral	$FeSO_4.7H_2O$ 1.4 mg/Kg/d
Acute systemic effects, inhalative	$FeSO_4.7H_2O$ 9.9 mg/m^3	Acute systemic effects, dermal	$FeSO_4.7H_2O$ 1.4 mg/Kg/d
Acute systemic effects, dermal	$FeSO_4.7H_2O$ 2.8 mg/Kg/d	Acute systemic effects, inhalative	$FeSO_4.7H_2O$ 2.5 mg/m^3
Acute systemic effects, inhalative	$FeSO_4.7H_2O$ 9.9 mg/m^3	Acute systemic effects, oral	$FeSO_4.7H_2O$ 1.4 mg/Kg/d
		Acute systemic effects, dermal	$FeSO_4.7H_2O$ 1.4 mg/Kg/d
		Acute systemic effects, inhalative	$FeSO_4.7H_2O$ 2.5 mg/m^3

PNECs: PNECs given were derived based on the concentration which would cause a 10% increase above typical natural background levels of iron in soil in sediment. Thus the respective PNEC is equal to 110% of the typical natural background level of iron.

Water: Iron is an essential trace element for fish, aquatic invertebrates and plants. A direct toxicity could not be demonstrated in tests. Therefore no PNEC was derived.

Sewage treatment plants (STP): Fe: 500 mg/l; $FeSO_4.7H_2O$ 2483 mg/l

Sediment: PNEC Sediment (freshwater): Fe 49.5 g/Kg; FeSO4.7H2O : 246 g/Kg dry weight
PNEC Sediment (marine): Fe 49.5 g/Kg; FeSO4.7H2O : 246 g/Kg dry weight

Soil: PNEC soil: Fe: 55.5 g/Kg; FeSO4.7H2O : 276 g/Kg dry weight

Oral: Iron is an essential trace element for fish, aquatic invertebrates and plants. A direct toxicity could not be demonstrated in tests. Therefore no PNEC was derived.

Manganese sulphate:
Acute toxicity:

Acute Toxicity (Oral LD50): 2150 mg/kg Rat
Test method(s): Indian Journal of Pharmacology, 23(3): 153-159. REACH dossier information
Based on available data the classification criteria are not met.

Acute Toxicity (Dermal LD50): Not determined.
Dermal absorption is unlikely due to the physical-chemical properties of the substance.

Acute Toxicity (Inhalation LC50): > 4.45 mg/l (dust/mist) Rat 4 hours
Test method(s): OECD 403.
Based on available data the classification criteria are not met.

Skin Corrosion/Irritation: Erythema\eschar score No erythema (0).
Oedema score No oedema (0).
Test method(s): OECD 404, not irritating.

Serious eye damage/irritation: Irritating. Irritation score: 36 / 110
Test method(s): OECD 405.

Respiratory or skin sensitisation: Skin sensitisation
Patch Test: Mouse
Not Sensitising.
REACH dossier information

Germ cell mutagenicity: Genotoxicity - In Vitro
Gene Mutation: REACH dossier information - A surrogate substance (Manganese chloride) was used.
Test method(s): OECD 476. + 471.
Negative.
Genotoxicity - In Vivo
Chromosome aberration: REACH dossier information - A surrogate substance (Manganese chloride) was used. Test method(s): OECD 474.
Negative.

Carcinogenicity: Carcinogenicity
NOAEL (male) 615 mg/kg Oral Rat
NOAEL (female) 715 mg/kg Oral Rat
REACH dossier information - Test method(s): 70 male and 70 female rats were fed diets containing 0, 1, 500, 5, 000, or 15, 000 ppm manganese (II) sulphate monohydrate for 103 weeks. The level of manganese in the diet received by controls was approximately 92 ppm.
As many as 10 rats per group were evaluated after 9 months and 15 months of chemical exposure.
Based on available data the classification criteria are not met.

Reproductive Toxicity: Reproductive Toxicity - Fertility
Endpoint waived according to REACH Annex VII, IX or XI.
Testing waived because a more severe health effect was found (STOT-RE class2). Controlling the risk of 'STOT-RE class 2' will control the risks for this endpoint.
Suspected reproductive toxicant based on limited evidence.
Reproductive Toxicity - Development
Endpoint waived according to REACH Annex VII, IX or XI.
Testing waived because a more severe health effect was found (STOT-RE class2). Controlling the risk of 'STOT-RE class 2' will control the risks for this endpoint.
Suspected reproductive toxicant based on limited evidence.

Specific target organ toxicity - single exposure: STOT - Single exposure; scientifically unjustified.

Specific target organ toxicity - repeated exposure: STOT - Repeated exposure; not determined.
Target Organs: Brain
$MnSO_4$ is already classified under Directive 67/548/EEC as R48/20/22 and under GHS as STOT RE2. Data exists showing some neurochemical changes at low levels after inhalation exposure for 90-days, together with locomotor changes, around 3 mg/m3 concentration, suggesting that significant toxicity could occur at the 20-200 mg/m3 concentration level, which supports the current classification of STOT RE 2 for the inhalation route.

Aspiration hazard: Viscosity: Not applicable.

Inhalation: Prolonged inhalation of high concentrations may damage respiratory system.

Ingestion: May cause discomfort if swallowed.

Skin contact: Powder may irritate skin.
Eye contact: Route of entry. Particles in the eyes may cause irritation and smarting.
Inhalation: Target Organs: Brain, eyes, respiratory system, lungs, skin

Copper sulphate pentahydrate:
Toxicological information
Copper is an essential element and therefore, its concentration in the body is strictly and efficiently regulated by homeostatic mechanisms.
Inhalation: The "respirable" fraction is assumed to be 100% absorbed. Absorption of the "inhalable" fraction depends on particle size. The Multiple Path Model of Particle Deposition (MPPD) can quantify the particle dependent absorption.
Oral: An oral absorption of 25% has been adopted, based on studies in the rat.
Dermal: A dermal absorption of 0.3% has been adopted for soluble and insoluble copper substances in solution or suspension, based on in- vitro percutaneous tests with human skin. For dry exposure, a dermal absorption value of 0.03% applies.
Acute toxicity: Acute Toxicity (Oral LD50) ~ 480 mg/kg Rat
Test method(s): OECD 401. Harmful if swallowed.
Acute Toxicity (Dermal LD50) > 2000 mg/kg Rat
Not classified. Test method(s): OECD 402.
Based on available data the classification criteria are not met.
Acute Toxicity (Inhalation LC50) Not determined.
Inhalation is not considered to be a likely route of exposure based on the physical properties of the substance. Based on available data the classification criteria are not met.
Skin Corrosion/Irritation:: Dose: 0.5 g; 4 hr Rabbit
Erythema\eschar score average < (1)
Oedema score: No oedema (0).
Test method(s): OECD 404. This OECD study concluded that there should be no classification - this result is less severe than the harmonized classification as a Category II skin irritant set out in Annex VI of Regulation 1272/2008. Not irritating.
Serious eye damage/irritation: A test carried out in 3 male rabbits resulted in severe ocular irritation that was not reversible within the duration of the test. Test guideline OECD 405. Copper sulphate pentahydrate meets the criteria for causing serious eye damage. This is more severe than the harmonized classification as an eye irritant set out in Annex VI of Regulation EC 1272/2008.
Respiratory or skin sensitisation: Skin sensitisation: Guinea pig maximization test (GPMT): Test method(s): OECD 406.
Not Sensitising.
Germ cell mutagenicity: Genotoxicity - In Vitro
Gene Mutation: Test method(s): OECD 471. Negative.
Genotoxicity - In Vivo
DNA damage and/or repair: Test method(s): OECD 486. A mouse micronucleus test (EC method B.12) also gave negative results.
Negative.
Carcinogenicity: Carcinogenicity - Based on a weight of evidence approach, it was concluded that copper compounds do not have carcinogenic potential.
Test method(s): Journal of the American Pharmaceutical Association, 43(12): 722-737, Br. J. Cancer Sep; 23(3): 591-596, Fd Cosmet. Toxicol. 11: 827-840.
Not Classified
Reproductive Toxicity: Reproductive Toxicity - Fertility
Two-generation study: LOAEL 23.5 mg/kg Oral Rat F2a
The units are expressed in 'mg/µg' of: Copper. Not classified. Test method(s): OECD 416.
Reproductive Toxicity - Development
Teratogenicity: LOAEL 9 mg/kg Oral Rabbit
Not classified. Test method(s): OECD 414.
Specific target organ toxicity - single exposure: STOT - Single exposure
Scientifically unjustified, already classified for Acute Oral Toxicity.
Specific target organ toxicity - repeated exposure: STOT - Repeated exposure –
A 90-day oral repeat dose study conducted with copper sulphate pentahydrate in rats and mice (test method equivalent to EU B.26) gave the following results:
For stomach lesions: NOAEL in the rat: 16.7 mg Cu/kg bw/day
NOAEL in male mice 97 mg Cu/kg bw/day

		NOAEL in female mice: 126 mg Cu/kg bw/day
	Liver and kidney damage:	NOAEL in the rat: 16.7 mg Cu/kg bw/day
	This study was used to calculate of an oral and systemic DNEL of 0.041 mg Cu/kg bw/day (including a Safety factor of 100 and an oral absorption of 25%).	
	Not classified.	
Aspiration hazard:	Viscosity, no data available.	
Inhalation:	Prolonged inhalation of high concentrations may damage respiratory system.	
Ingestion:	May irritate and cause stomach pain, vomiting and diarrhoea.	
Skin contact:	Acts as a defatting agent on skin. May cause cracking of skin, and eczema. Prolonged or repeated exposure may cause severe irritation.	
Eye contact:	Causes serious eye damage.	
Health Warnings:	The product causes irritation of mucous membranes and may cause abdominal discomfort if swallowed.	
	Target Organs:	Skin, eyes, respiratory system, lungs.

Citric acid

Acute toxicity:	Ingestion LD50 (mouse):	5400 mg/kg bw
	Inhalation:	No data
	Skin Contact. LD50 (dermal):	>2000 mg/kg bw
Skin corrosion/irritation:	mild skin irritant	
Eye Contact:	Irritating	
Respiratory or skin sensitization:	Not a sensitizer	
Mutagenicity:	Not a mutagen	
Carcinogenicity:	Not a carcinogen	
Reproductive toxicity:	Not a reproductive toxin	

Zinc sulphate:

Acute toxicity:	Acute Toxicity (Oral LD50)	> 574 mg/kg Rat
	Very soluble zinc sulphate (monohydrate, hexahydrate and heptahydrate) has LD50 oral values ranging from 574 to 2, 949 mg/kg bw, 862 to 4, 429 mg/kg bw and 920 to 4, 725 mg/kg bw, respectively for the three forms of zinc sulphate. Tests conducted to standard protocols Litton (Bionetics, 1974, Courtois et al., 1978.)	
	Acute Toxicity (Dermal LD50)	> 2000 mg/kg Rat
	Test method(s): OECD 402. (Van Huygevoort 1999)	
	Acute Toxicity (Inhalation LC50):	Rat 4 hours
	Effects of inhalation exposure to zinc sulphate were limited to pulmonary effects only.	
Skin Corrosion/Irritation:	Dose Rabbit	
	Primary dermal irritation index (PDI):	0
	Erythema\eschar score:	No erythema (0).
	Oedema score:	No oedema (0).
	Not classified, not irritating. Test method(s): OECD 404. (Van Huygevoort 1999)	
Serious eye damage/irritation:	Irritating. Test method(s): OECD 405. (Van Huygevoort 1999)	
Respiratory or skin sensitisation:	Skin sensitisation	
	Patch Test: Mouse (Van Huygevoort, 1999 i, Ikarashi et al, 1992)	
	Not Sensitising.	
Germ cell mutagenicity:	Genotoxicity - In Vitro	
	Gene Mutation:	In vitro genotoxicity studies indicate that zinc compounds do not have genotoxic activity [Zinc CSR(s), 2010]. This conclusion is in line with those achieved by other regulatory reviews of the genotoxicity of zinc compounds (WHO, 2001; EU RAR, 2004, MAK, 2009).
	Negative.	
	Genotoxicity - In Vivo	
	Chromosome aberration:	In vivo genotoxicity studies indicate that zinc compounds do not have genotoxic activity [Zinc CSR(s), 2010]. This conclusion is in line with those achieved by other regulatory reviews of the genotoxicity of zinc compounds (WHO, 2001; EU RAR, 2004, MAK, 2009).
	Negative.	

Carcinogenicity: No experimental or epidemiological evidence exists to justify classification of zinc compounds for carcinogenic activity (based on cross-reading between Zn compounds; no classification for carcinogenicity required) (Chemical Safety report (CSR) zinc oxide. 2010).

Reproductive Toxicity: Reproductive Toxicity - Fertility - No experimental or epidemiological evidence exists to justify classification of zinc compounds for reproductive or developmental toxicity (based on cross-reading between Zn compounds; no classification for reproductive toxicity required) (Chemical Safety Report (CSR) for zinc compounds. 2010)

Specific target organ toxicity - single exposure: STOT - Single exposure -
No experimental or epidemiological sufficient evidence for specific target organ toxicity (single exposure) (based on cross-reading from ZnO; no classification for target organ toxicity (single exposure: STOT-SE) required) (Heydon and Kagan, 1990; Gordon et al., 1992; Mueller and Seger, 1985 [Cited in Chemical Safety report (CSR) zinc sulphate. 2010)]).

Specific target organ toxicity - repeated exposure: STOT - Repeated exposure -
No experimental or epidemiological sufficient evidence for specific target organ toxicity (repeated exposure) (no classification for specific target organ toxicity (repeated exposure: STOT-RE) required) (Lam et al, 1985, 1988; Conner et al. , 1988 [Cited in Chemical Safety Report (CSR) for zinc(s). 2010)]).

Aspiration hazard: Viscosity: No data available.

Health Warnings: INHALATION. Prolonged inhalation of high concentrations may damage respiratory system. SKIN CONTACT. Acts as a defatting agent on skin. May cause cracking of skin, and eczema. Prolonged or repeated exposure may cause severe irritation. EYE CONTACT. May cause severe irritation to eyes. INGESTION. The product causes irritation of mucous membranes and may cause abdominal discomfort if swallowed.

Target Organs: Skin, eyes, respiratory system, lungs

Disodium octaborate tetrahydrate:

Oral acute toxicity: Low acute oral toxicity;

Value used for CSA: LD50 (male rat): 2000 mg/kg body weight (Test material: Diboron trioxide, OECD Guidleine 401 (Acute Oral Toxicity)
LD50 (male albino rat): 3450 mg Boric acid/kg, equivalent to 604 mg B/kg body weight (Test material: Boric Acid).
LD50 (female albino rat): 4080 mg Boric acid/kg, equivalent to 714 mg B/kg body weight (Test material: Boric Acid).

Inhalation: Low acute inhalation toxicity.
LD50 (4h) (male/female rat), > 2.01 mg/L air (Test material: Disodium octaborate tetrahydrate, OECD Guideline 403 (Acute Inhalation Toxicity)
LC50 (5h) in rats ((male/female): > 2030 mg/m3 air (Test material: Boric acid).

Dermal: LD50 (24h) (rabbit male/female): > 2000 mg/kg of body weight (Test material: Boric acid, according to FIFRA 40 CFR 163 and OECD Guideline 402 (Acute Dermal Toxicity)). No acute dermal toxicity and no clinical or pathological findings were observed. Disodium octaborate tetrahydrate is poorly absorbed through intact skin.

Skin/corrosion/irritation: In the acute dermal irritation studies on the rabbits, no irritancy was observed. (Test material: Disodium octaborate tetrahydrate, according to FIFRA (40 CFR 158, 162, 163) and Toxic Substances Control Act (40 CFR 798). Based on available data, the classification criteria as skin corrosion/irritant are not met.

Serious eye damage/irritation: The primary eye irritation of Disodium octaborate tetrahydrate was evaluated. The test material produced iris and conjunctival irritation, when applied with rinsing at 24h to the eyes of New Zealand white rabbits. Irritation scores in individual animals ranged from 0 to 19 (from a max of 110). No evidence of corrosion was noted. Guideline FIFRA (40 CFR, 162) and TSCA (40 CFR 798).
Years of occupational exposure to Disodium octaborate tetrahydrate indicates no adverse effects on human eye. Therefore is not considered to be a human eye irritant in normal industrial use.
Based on available data, the classification criteria as eye irritant are not met

Respiratory or skin sensitization: Disodium octaborate tetrahydrate was determined to be not sensitizing in guinea pigs according to OECD Guideline 406 (Skin Sensitization).
Based on available data, the classification criteria as sensitizer are not met.

Germ cell mutagenicity:	The study on bacterial reverse mutation assay (e.g. Ames test) was made on S. typhimurium TA 1535, TA 1537, TA 98 and TA 100. No mutagenic activity was observed. (Test material: Boric Acid). Based on available data, the classification criteria as mutagen are not met
Carcinogenicity:	The study according OECD Guideline 451 on B6C3F1 mice treated in diet for 103 weeks with 0, 2500 or 5000 ppm Boric acid showed no evidence of carcinogenicity. Based on available data, the classification criteria as cancerigen are not met.
Reproductive/toxicity:	Animal feeding studies in rat, mouse and dog at high doses, have demonstrated adverse haematological effects and the main target organ of boron toxicity is the testis. Studies in rat, mouse and rabbit, at high doses, demonstrate developmental effects on the fetus, including fetal weight loss and minor skeletal variations. The doses administered were many times higher than those to which humans would normally be exposed to. A three generation study on rat Sprague-Dawley showed no adverse effects on reproduction and no gross abnormalities in the organs at exposures of 50 and 155 mg/kg body weight borax (corresponding to a level of 5.9 and 17.5 mg B/kg body weight). Was reported no adverse effects on fertility, lactation, litter size, progeny weight or appearance in rats exposed to either 5.9 or 17.5 mg B/kg body weight. NOAEL (No Observed Adverse Effect Level) for fertility (rat males) of 17.5 mg B/kg/day). Rats exposed to the high dose of 518 mg/kg body weight of borax (corresponding to a level of 58.5 mg B/kg body weight) were sterile. Microscopic examination of the atrophied testes of all males in this group showed no viable sperm. It was also reported evidence of decreased ovulation in the majority of ovaries examined from the females exposed to 58.5 mg B/kg body weight and no litters were obtained from these high dose females when mated with control male animals. LOAEL (Lowest Observed Adverse Effect Level) for fertility (rat female/male) of 58.5 mg B/kg body weight/day. The high dose group (58.5 mg B/kg body weight) males and females showed clinical signs of toxicity with rough fur, scaly tails, respiratory distress and inflamed eyelids. Based on these study data, was concluded that exposure of rats at levels up to 17.5 mg B/kg body weight in the diet in a 3 generation reproduction study was without adverse effect. There is no evidence of developmental effects in humans attributable to boron in studies of populations with high exposures to boron. Disodium octaborate tetrahydrate is self classified as Toxic for reproduction, Repro 1B, H360FD according to the new classification system from EC Regulation 1272/2008 (CLP)
Repeated Dose toxicity:	2-year dietary feeding study in Sprague Dawley rats (male/female), exposed at different values of Boric acid (0, 33 (5.9), 100 (17.5), 334 (58.5) mg Boric acid (B)/kg body weight per day), showed effects as: coarse hair coats, hunched position, swollen pads and inflamed bleeding eyes, testicular atrophy and seminiferous tubule degeneration were observed in animals receiving the highest dose of Boric acid. NOAEL 17.5 mg Boron/kg body weight/day LOAEL 58.5 mg Boron/kg body weight/day No treatment related effects were observed in the mid and low dose groups.

11.2. Other Information
None.

SECTION 12: Ecological Information

12.1. Toxicity
Mixture Classified as very toxic to aquatic life with long lasting effects to the environment in accordance with the Dangerous Preparations Directive 1999/45/EC.

Toxicity of ingredients where available:

Manganese sulphate:

Acute Toxicity - Fish:	LC50 96 hours 14.5 mg/l Onchorhynchus mykiss (Rainbow trout). REACH dossier information.
Acute Toxicity -Aquatic Invertebrates:	EC50 48 hours 9.8 mg/l Daphnia magna. A surrogate substance (Manganese chloride) was used. The units are expressed in 'mg/µg' of: Manganese. REACH dossier information.
Acute Toxicity - Aquatic Plants:	EC50 72 hours 61 mg/l. Desmodesmus subspicatus (algae). Test method(s): OECD 201. REACH dossier information.
Chronic Toxicity - Aquatic Invertebrates:	Not applicable. A variety of tests have indicated that a classifcation more severe than Aquatic Chronic 2 is not required (CSR 2010). REACH dossier information.

Copper sulphate:
Acute toxicity of copper ions was assessed using 451 L(E)C50 values from studies on soluble copper compounds. The lowest species-specific geometric mean reference value of 25.0 µg Cu/L was an L(E)C50 obtained for Daphnia magna at pH 5.5 - 6.5.

CHRONIC FRESHWATER TOXICITY- test results and PNEC derivation:
Chronic toxicity of copper ions from soluble copper compounds was assessed using 139 NOEC/EC10 values from 27 species representing different trophic levels (fish, invertebrates and algae). Species-specific NOECs were normalised using Biotic Ligand Models and used to derive Species Sensitivity Distributions (SSD) and a lowest HC5 (the median fifth percentile of the SSD) of 7.8 µg dissolved Cu/L. This value is considered to be protective of 90% of EU surface waters and represents a reasonable worst case. Applying an assessment factor of 1, a default chronic freshwater PNEC of 7.8 µg dissolved Cu/L is assigned to assess local risks.

CHRONIC MARINE WATERS TOXICITY- test results and PNEC derivation:
Chronic toxicity of copper ions from soluble copper compounds was assessed using 51 NOEC/EC10 values from 24 species representing different trophic levels (fish, invertebrates and algae). Species-specific NOECs were calculated after normalizing to dissolved organic carbon (DOC) and were used to derive SSDs and HC5 values. Normalisation at a typical DOC for coastal waters of 2 mg/l resulted in an HC5 of 5.2 µg dissolved Cu/L. Applying an assessment factor of 1, a default chronic marine PNEC of 5.2 µg dissolved Cu/L is assigned to assess local risks.

CHRONIC FRESHWATER SEDIMENT TOXICITY- test results and PNEC derivation:
Toxicity of copper ions from soluble copper compounds was assessed using 62 NOEC values from 6 benthic species. The NOECs were related to DOC and Acid Volatile Sulphide (AVS) and were used to derive SSDs and HC5 values. An HC5 of 1741 mg Cu/kg OC, corresponding to 87 mg Cu/kg dry weight, was calculated for a low AVS sediment with a default OC of 5%. Applying an assessment factor of 1, a default chronic freshwater sediment PNEC of 87 mg Cu/kg dry weight is assigned to assess local risks.

CHRONIC TERRESTRIAL TOXICITY- test results and PNEC derivation:
Toxicity of copper ions from soluble copper compounds was assessed using 252 NOEC/EC10 values from 28 different species representing different trophic levels (decomposers, primary producers, primary consumers). NOEC values were adjusted to account for differences between lab-spiked soils and field-contaminated soils by the addition of a leaching ageing factor of 2. The adjusted values were then normalized to a range of EU soils using regression bioavailability models and used to derive SSDs and a lowest HC5 value of 65.5 mg Cu/kg dry weight. Applying an assessment factor of 1, a default chronic soil PNEC of 65.5 mg Cu/kg dry weight is assigned.

TOXICITY TO SEWAGE TREATMENT PLANT (STP) MICRO-ORGANISMS
The toxicity of copper ions from soluble copper compounds was assessed using NOEC and EC50 values from high quality studies with STP bacteria and protozoa. The statistically-derived NOEC was 0.23 mg Cu/L in the STP. Applying an assessment factor of 1, a PNEC of 0.23 mg Cu/L is assigned for Sewage Treatment Plant.

Zinc sulphate:
The reference values for acute aquatic toxicity, based on the lowest observed EC50 values of the corresponding databases at different pH and expressed as Zn++ ion concentration are:

for pH <7:	0.413 mg Zn++/l (48 hr - Ceriodaphnia dubia test according to US EPA 821-R-02-012 standard test protocol; reference: Hyne et al 2005)
for pH >7-8.5:	0.136 mg Zn++/l (72 hr - Selenastrum capricornutum (=Pseudokircherniella subcapitata) test according to OECD 201 standard protocol; reference: Van Ginneken, 1994)

After applying the molecular weight correction (transformation/dissolution testing is not relevant since this zinc compound is readily soluble), the specific reference values for acute aquatic toxicity of the different zinc sulphates are:
For zinc monohydrate (a ZnSO4.H20/Zn molecular weight ratio of 2.74):
for pH <7: 1.13 mg Zn/l (based on 48 hr Ceriodaphnia dubia test cfr above)
for pH >7-8.5: 3.73 mg Zn/l (based on 72 hr Selenastrum capricornutum test cfr above)
For zinc hexahydrate (a ZnSO4.6H20/Zn molecular weight ratio of 4.12):
for pH <7: 1.70 mg Zn/l (based on 48 hr Ceriodaphnia dubia test cfr above)
for pH >7-8.5: 0.56 mg Zn/l (based on 72 hr Selenastrum capricornutum test cfr above)
For zinc heptahydrate (a ZnSO4.7H20/Zn molecular weight ratio of 4.4):
for pH <7: 1.82 mg Zn/l (based on 48 hr Ceriodaphnia dubia test cfr above)
for pH >7-8.5: 0.60 mg Zn/l (based on 72 hr Selenastrum capricornutum test cfr above)
M-factor: 1

CHRONIC AQUATIC TOXICITY:
The chronic freshwater aquatic toxicity database on zinc contains high quality chronic NOEC/EC10 values on 23 species (8 taxonomic groups) obtained under a variety of conditions. The chronic marine-water aquatic toxicity database on zinc contains high quality chronic NOEC/EC10 values on 39 species (9 taxonomic groups) obtained under a variety of conditions. These data, outlined in the CSR, were compiled in a species sensitivity distribution, from which the PNECs for freshwater and marine-water were derived (expressed as Zn+2ion concentration).

12.2. Persistence and degradability
Readily biodegradable

12.3. Bioaccumulative potential
Information not available

12.4. Mobility in soil
Information not available

12.5. Results of PBT and vPvB assessment
Not classified

12.6. Other adverse effects
Information not available

SECTION 13: Disposal Considerations

13.1. Waste treatment methods
Use only licensed waste disposal companies. Do not re-use empty containers for any purpose, dispose of packaging in accordance with local regulations.

SECTION 14: Transport Information
14.1 UN number: UN3077
14.2 UN proper shipping name: Environmentally hazardous preparation, solid N.O.S. (contains: Iron sulphate E.C. 231-753-5, Manganese sulphate E.C. 232-089-9, Copper sulphate E.C. 231-847-6, Zinc sulphate E.C. 231-793-3)
14.3 Transport hazard: 9
14.4 Packing group: III
14.5 Environmental hazards: Product is classified as toxic to aquatic life with long lasting effects.
14.6 Special precautions for user: Not specified
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code:
Applicable for Maritime bulk transport only. Check with carrier.

SECTION 15: Regulatory Information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
This substance is classified and labelled in accordance with regulation 1999/45/EC, 1272/2008, the statutory instrument No.716 2009 Chemicals (Hazard Information and Packaging) regulations and the EC Fertiliser Regulations 2003, Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments. Regulation (EC).

15.2. Chemical Safety Assessment
CSA not undertaken for this substance.

---

16. OTHER INFORMATION

The information contained herein relates only to the designated formulation and may not be valid if product is used in combination with other substances. The information is to the best of our knowledge, belief and understanding, true, accurate and reliable at the date of issue. However, the information may neither be exhaustive or complete, and no warranty, guarantee or liability concerning the accuracy or completeness of the information is expressed or implied. It is the user's risk and sole responsibility to verify and satisfy their own criteria and duty of care concerning the validity of the information in relation to their application of the product.

ISSUE 1 08/15 GCL
