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	Printing date: 20. 05. 1995
Substance name: GREEN VITRIOL	Revision date: 21.08.2018
	Number of the revision: 16

1. Identification of substance / mixture / company	
1.1.	Product identification (Registration number of the substance): GREEN VITRIOL (01-2119513203-57-0014)
1.2.	Important identified use of the substance: Inorganic fertilizer - Green vitriol can help prevent or alleviate iron deficiency (iron chlorosis) on fruit trees, grapevine, ornamental plants and on many other crops. Industrial and professional use: manufacturing of iron chlorides, precipitation agent in the field of wastewater treatment, additive in cement industry for chromate reduction, as laboratory chemical, additive for animal feed and fertiliser. Use is not permitted in the buffer zones of drinking water, lakes, rivers and streams. Not mixed with products of oxidation.
1.3.	Manufacturer / supplier (importer, the distributor):
1.3.1.	Supplier's name: CINKARNA CELJE, d.d. Division: Kemija Celje
1.3.2.	Supplier's address and phone number: Kidričeva 26, 3001 Celje, SLOVENIA Tel.: +386 3 427 60 00
1.3.3.	Contact (email address) : vesna.gabersek@cinkarna.si
1.4.	Emergency telephone number: In the case of health hazards consult with personal or emergency doctor, in the case of life-threatening situation, call 112 . Additional information is available: Weekdays from 7 to 15 am: Phone: +386 3 427 6341
2. Hazards identification	
2.1.	Classification of the substance or mixture: (in accordance with Regulation (EC) No. 1272/2008) Health hazards /Acute Oral/; Category 4 Skin and Eye Irritation; Cat. 2 Skin Sensation; Cat. 1 Hazard Statements: H302, H315, H317, H319
2.2.	Elements label: <i>Pictogram: GHS07</i>  Warning Hazard Statements: H302, H315, H317, H319 <i>Precautionary Statements:</i> Prevention: P280 Response: P301 + P312, P302 + P352, P305 + P351 + P338, P310 Disposal: P501 <i>Register of phrases – section 16.</i>
2.3.	Other hazards: No need

Substance name: **GREEN VITRIOL****3. Composition / information on ingredients**3.1./ **Substance / mixture:**3.2. **GREEN VITRIOL****In accordance with Regulation (EC) No. 1272/2008**

Chemical name	Index No: not specified EC No.: 231-753-5 CAS No.: 7782-63-0 (heptahydrate) and 7720-78-7 (water free form)	Concentration	Hazard phrases (H)	Class and category of risk
Iron (2+) sulphate		> 80 wt. %	302, 315, 317, 319	Health Hazards /Acute Oral/ ; Category 4 Skin and Eye Irritation; Cat. 2 Skin Sensation; Cat. 1

4. First aid measures

4.1.	Description of the first aid	
	After inhalation:	The patient is immediately removed from the contaminated area into fresh air or into well ventilated area and is provided with the basic life support. Call medical support and submit original packaging with label.
	After skin contact:	Remove contaminated clothing and shoes. Thoroughly wash the affected parts of the body with water and soap.
	After eye contact:	Rinse the opened eye for 15 minutes under running water. Apply a loose bandage and consult an ophthalmologist.
	After swallowing:	Rinse the affected mouth with water and drink 2 dl of water. Remain calm, keep warm and obtain medical assistance immediately.
4.2.	The most important symptoms and effects both acute and belated:	Various tests indicate possible occurrence of nausea, vomiting and diarrhea. Change of colour of mud to pink ia an indicator of poisoning with iron.
4.3.	Indication of any immediate medical care and special treatment:	If necessary, decontaminate the skin and mucous membranes. Obtain medical assistance immediately.

5. Fire fighting measures

5.1.	Extinguishing media	
	Suitable extinguishing agents:	Dry extinguishing resource, carbon dioxide (CO ₂), foam.
	Unsuitable extinguishing agents:	Do not use direct water jet.
5.2.	Specific risks associated with the substance or mixture:	In the case of fire – the material may yield irritating decomposition products such as sulfur trioxide and sulfur dioxide.
5.3.	Advice for Firefighters:	Not required.

6. Accidental release measures

6.1.	Personal precautions, protective equipment and emergency procedures	
6.1.1.	For non-qualified persons:	See section 8.2
6.1.2.	For rescuers:	See section 8.2
6.2.	Environmental precautions	If the water pollution – inform the competent services.
6.3.	Methods and materials for containment and cleaning	
6.3.1.	Appropriate spill containment techniques:	In the event of substance being mixed with water – prevent (substance cover with soil or other absorbent materials) the spread into the underground drainage pipe system or streams.
6.3.2.	Appropriate cleaning procedures	
	Techniques of neutralization:	Cover the substance with soil, peat or other neutral absorbent material.
	Decontamination techniques:	Spillage: protect the affected area; danger warnings must be placed in order to protect the contaminated area; notify responsible authorities about the existing danger; withdraw all workers against the direction of the wind; use personal

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		protective equipment (as described in 4.1); call the relevant Center for more Information.
	Absorbent materials:	Neutral absorbent materials: soil, turf, sand or other absorbent material.
	Cleaning techniques:	In the case of spillage pick up the substance with a shovel and place it into a clean and labeled container with a fully sealable lead. Do not breathe in the dust. If the substance can not be re-used it should be disposed of in accordance with the applicable Rules of the disposal of hazardous waste. If the substance is mixed with absorbent material in moisture soil, it should be mechanically removed like hazardous waste. We use personal protective equipment (read 4.1). After work the soil and dirty objects area is washed with water and detergent. Waste water should not enter drain systems or watercourses.
	Suction techniques:	Use industrial vacuum cleaner for dry cleaning – wet and dry vacuum cleaners (with a brush, with adapter for dust).
	The equipment needed for containment / cleaning:	The equipment used depends on the type and extent of contamination. Cleaning is carried out under supervision of experts. It usually takes fire management intervention.
6.3.3.	Improper cleaning techniques:	Retention in the direction of the wind; rinse with water before the substance is mechanically removed; use of detergent with an acid reaction.
6.4.	References to other sections:	Not required.
7. Handling and storage		
7.1.	Precautions for safe handling	
7.1.1.	Recommendations	
	Safe handling with the substance or mixture:	Use in well ventilated area. Accumulation of dust and powder should be reduced to a minimum. Mandatory use of personal protective equipment (read section 8.2). Follow instructions for safe handling of hazardous materials and instructions on safety and health at work.
	Prevent treatment with incompatible materials:	Follow all instructions for the work and SDS.
	Prevent releases of substance or mixture:	Follow all instructions for the work and SDS.
7.1.2.	General hygiene (eating, drinking and smoking is strictly prohibited in working areas; washing hands;...):	Use personal protective equipment. Upon completion of work protective clothing must be washed. Likewise the person must wash their hands with water and soap. Even during the break workers should wash their hands. While working you should not eat, drink or smoke.
7.2.	Conditions for safe storage, including the incompatibility	
	Command the risks associated with	
	- explosive atmospheres:	It isn't prescribed.
	- corrosive substances:	Not specified.
	- incompatible substances or mixtures:	Substances alkaline reaction, soluble carbonates, substances which oxidize.
	- volatile substances:	Not specified.
	- potential sources of ignition:	Unspecified.
	Control effects	
	- weather conditions:	Substance shouldn't be exposed to rain and shouldn't be used in areas with high humidity.
	- environmental pressure:	Unspecified.
	- temperature:	Room temperature.
	- solar light:	Substance must be separated from direct sunlight.
	- humidity:	The substance is hygroscopic.
	- vibration:	Not specified.
	Ensuring the integrity of the substance or mixture by the use of	
	- stabilizers:	Not required.
	- antioxidants:	Not required.
	Other advices including the following	
	- requirements on prevention:	Keep in original packaging (closed and labeled) in a well ventilated area in a dry, cool place (room temperature), away from children, animals and unauthorized people.

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		Protect from direct sunlight.
	- specific constructions for storehouse:	Specific constructions are not required.
	- limits by storage conditions:	Limit quantities are not provided by proper storage.
	- compatibility with packaging:	Substance is compatible with the packaging.
7.3.	Specific end use:	Use only in accordance with instructions (point 1.2).

8. Exposure controls / personal protection

8.1.	Control parameters	
8.1.1.	Threshold limit value (TLV):	No data
	DNEL	Iron is an essential metal. <u>Acute – systemic and long-term effects:</u> Workers (dermal) = 0.57 mg/kg Workers (inhalation) = 2 mg/m ³ <u>General population:</u> Dermal = 0.29 mg/kg; inh. = 0.5 mg/m ³ ; oral = 0.29 mg/kg
	PNEC	Sediment: 49.5 g/kg Soil: 55 g/kg Water treatment: 500 mg/L (microbiological activity) Atmosphere – air: no relevant exposure to be expected
8.2.	Exposure controls	
8.2.1.	Appropriate controls:	Ventilation (local and spatial).
8.2.2.	Personal protection	
	- respiratory protection:	In the case of short term-exposure use respirator-dust mask standard EN 149:2001+A1:2009, class: FFP3 protective factor 20. For prolonged or intense exposure use the filtering half masks standard EN 140:1999/AC:2000, with filter for particles EN 143:2017, type:P3.
	- skin protection:	The degree of protection depends on the purpose of handling of the substance. We can use protective clothing (standard EN 13688:2013), which can be washed after use and re-worn, and rubber footwear or footwear protecting against chemicals (standard EN 13832-1:2006). After work we wash with water and soap.
	- hand protection:	Protective gloves made of PVC, PE material or neoprene (standard EN 374-5:2017) with 0.1 to 0.4 mm thick for disposable gloves and 0.5 to 1.0 mm thick for re-usable gloves. After work we wash hands with water and soap and protect the skin with cream.
	- eye / face protection:	Safety glasses to the standard EN 166:2002.
	- heat hazard:	There are no thermic dangers.
	Other:	No need
8.2.3.	Environmental exposure controls:	Contaminated water from fire should not be spilled into drains or watercourses. We must prevent the development of dust – to ensure adequate ventilation and separate collection and disposal to an appropriate landfill regulated under the current Rules on the disposal of hazardous waste. <i>Informations for section 8 are from Voestalpine Stahl GmbH-Austria.</i>

9. physical and chemical properties

9.1.	Information on basic physical and chemical properties	
	- form:	Crystalline powder
	- colour:	Light green
	- odour:	Slightly acidic
	- pH:	Approx. 2.3 at 100 g/L water
	- melting point:	Hydrate water is released from the ferrous sulfate at approx. 64 °C and a solution of ferrous sulfate forms in its own hydrate water emerges.

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- boiling point:	No boiling point before decomposition.
- flash point:	Not required (solid).
- evaporation rate:	Not applicable.
- flammability:	The material is not combustible.
- upper / lower flammability or explosive limits:	Not applicable.
- vapour pressure:	Not applicable. Inorganic solid compound.
- vapor density:	Not applicable.
- relative density:	n.a.
- solubility:	Water: from 25 to 26 g FeSO ₄ / 100g (20 °C). More than 12 % Fe soluble in water.
- partition coefficient: n-octanol/water:	n.a.
- decomposition temperature:	n.a.
- viscosity:	Not required (solid).
- explosives properties:	No explosive properties.
- oxidizing solids:	Not oxidizing.
9.2 Other information:	Bulk density: (900 – 1000) kg/m ³

10. Stability and reactivity

10.1	Reactivity:	Substance is stable under normal conditions.
10.2	Chemical stability:	Thermal decomposition starting at 400 °C.
10.3	Possibility of hazardous reactions:	Formation of sulfur trioxide and sulfur dioxide and basic ferrous (III) sulfate.
10.4	Conditions to be avoided:	Moisture (substance is hygroscopic), substances alkaline reaction, soluble carbonates, substances which oxidize.
10.5	Incompatible materials:	Substances alkaline reaction, soluble carbonates, substances which oxidize.
10.6	Hazardous decomposition products:	Sulfur trioxide, sulfur dioxide.

11. Toxicological information

11.1	Podatki o toksikoloških učinkih	
	- acute toxicity:	LD50 oral. (rat) = 500 - 2000 mg/kg - /tests result/ Acute Oral; Category 4 Acute inhalation: No classification. LD50 derm. (rat) = > 2000 mg/kg - /tests/ No classification.
	- skin corrosion / irritation:	Skin irritation; Category 2 For solutions of concentration ≥ 10 %. Ferrous sulphate should not be seen as corrosive just as an irritant.
	- serious eye damage / irritation:	Eye irritation; Category 2 Results are available for a GLP-compliant guideline study (Johnson, 2003), which showed that a 25% solution of ferrous sulphate heptahydrate caused no more than mild redness and chemosis after instillation into the rabbit eye.
	- sensitization by inhalation and skin sensitization:	Skin sensation; Category 1
	- germ cell mutagenicity:	Not classified Iron salts have been extensively tested (vitro and vivo tests). It is concluded that iron salts are not genotoxic.
	- carcinogenicity:	Not classified Because of its potential pro-oxidant effects, studies include many clinical investigations.
	- reproductive toxicity:	Not classified NOAEL ≥ 500 mg/kg body weight/day (no adverse effects were observed) In humans, iron supplementation of about 5.8 to 11.7 mg/kg bw/day is routinely

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		prescribed throughout pregnancy with no adverse effects on pregnancy outcome.
	- STOT – single exposure:	Not classified
	- STOT – repeated exposure:	Not classified
	- aspiration hazard:	Not classified
<i>Informations for section 11 are from Voestalpine Stahl GmbH-Austria.</i>		

12. Ecological data

12.1.	Toxicity:	The substance is not classified. In general toxic effects will not be seen be the presence of ferrous sulphate in the environment. However ferrous sulphate may present a toxic hazard to environmental species under specific conditions. For example, it is possible that ferrous iron salts could have toxic effects in circumstances where the following conditions apply and persist: pH is low (<5), iron concentration is high (of the order of the apparent E(L)C50 values), oxygen content is very low, background concentrations of ferrous iron are low. Such conditions would need to result in dissolved iron concentrations in the order of 1 to 10 mg/l and would not be expected to arise from the industrial production and use patterns for this product.
12.2.	Stability and degradation:	An in-depth analysis of the oxidation and precipitation of iron was carried out by CEFIC as part of the recent European Chemicals Bureau classification process of ferrous sulphate (ECB, 2004b). A review of the scientific literature on the oxidation of ferrous sulphate reveals the following: Ferrous sulphate reacts with water to form ferrous hydroxide (Fe(OH) ₂), moderately insoluble. Any precipitate would in turn undergo further oxidation to form ferric hydroxide (Fe(OH) ₃) which is highly insoluble. Formation of ferric hydroxide at pH levels above 5.0 limits the presence of iron in aqueous systems. For inorganic metal salts the concept of biodegradation is not applicable in general (OECD, 2001). Removal of iron from solution via precipitation and abiotic processes is dominant. Iron is abundant in the environment from natural mineral sources and iron transformations and the whole iron cycle in the environment is a combination of abiotic and biological processes. In summary, in the environment, a number of important steps follow from any releases. In effect, ferrous and ferric ions can be treated together, because the ferrous ion is rapidly transformed to ferric ion under the conditions found at typical points of release. Ferric ions released into (or generated in) water will rapidly precipitate as highly insoluble oxides and oxo-hydroxides. These stable compounds are exactly the forms in which iron is found naturally in the earth's crust.
12.3.	The ability to accumulate in organisms:	Biologically, iron is an essential trace element for organisms including micro-organisms, plants and animals. Iron plays an important role in biological processes, and iron homeostasis is under strict control.
12.4.	Mobility in soil:	Soil is the primary reservoir of naturally occurring iron. It has its own surface geochemical cycle. Iron can be mobilized from soil or sediment to surface waters as colloidal ferric hydroxide, fine suspended particulates and inbound to clay silt. Factors like pH, CO ₂ concentration, redox conditions, availability of organic and inorganic complexing agents and soil type contribute to reactions of iron in soil.
12.5.	Results of PBT and vPvB assessment:	The substance is not considered to PBT/vPvB. The criteria for persistence, bioaccumulation potential and toxicity are not met. <i>Informations for section 12 are from Voestalpine Stahl GmbH-Austria.</i>
12.6.	Other adverse effects:	n.a.

13. Disposal considerations

13.1.	Methods of waste management:	Residues of substances are stored in their original packaging. Waste materials and packaging are given on rent to an authorized collector of hazardous substances in accordance with applicable environmental legislation, which regulates hazardous waste management and the management of packaging and packaging waste. Caution: Do not re-use empty containers!
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14. Transport information

	ADR, RID:	It is not according as hazardous on the transport regulation.
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14.1	UN Number:	/
14.2	Proper shipping name:	/
14.3	Class:	/
14.4	Packaging group:	/
14.5	Environmental hazards:	/
14.6	Special precautions:	/
14.7	Cargo transport with Annex II of MARPOL 73/78 and the IBC code:	/
14.8.	Tunnel restriction code:	/
14.9.	Classification code:	/
14.10.	Hazard label:	/

15. Regulatory information

15.1.	Regulations / legislation on health, safety and environment specific substance:	This fertilizer is a subject to applicable regulations of Fertilizer; CLP Regulation; REACH Regulation; Rules on Classification, Packaging and Labeling of dangerous substances; Chemicals law and the law of: safety, occupational health, environmental protection and management of hazardous chemicals; Rules on the protection of workers from the risks related to exposure to chemical agents at work; Rules on personal protective equipment; International carriage of dangerous goods by road / ADR /; A list of harmonized standards, the use of which creates a presumption of conformity of the product with the requirements.
15.2	The chemical safety assessment:	A chemical safety assessment for the substance is done.

16. Other information:

	Indication of changes	Point 8.2.2 and 15.1
	A list of all phrases of the hazard (H) and precautionary statements (P) from 2 to 15:	H302 Harmful if swallowed. H315 Causes skin irritation. H317 May cause an allergic skin reaction. H319 Causes serious eye irritation. P280 Wear protective gloves/protective clothing/eye protection/face protection. P301 + P312 IF SWALLOWED: Call a POISON CENTER or doctor / physician. 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. P501 Dispose of contents / container in accordance with national regulations.
	Training of workers:	A Course of safety, occupational health, fire safety and handling of hazardous chemicals.
	Sources:	Regulation (EC) No.: 1907/06; 1272/08; 453/2010; 23/08; 56/10 Commission Directive No.: 2008/58/ES; 2009/2/ES Voestalpine Stahl GmbH-Austria

Information is based on our knowledge of the product during the preparation of this data sheet. If the buyer does not use the product as advised he will carry the responsibility of any damages that may occur. Of course, the information in the SDS shall not relieve anyone of customer duty to take into the account all legislation that is bound to its area of activity.

Word list

CLP = Classification, Labelling and Packaging
 CSR = Chemical Safety Report
 ECB = European Chemicals Bureau
 GESTIS = International Limit Values
 GHS = Globally Harmonized System
 LD50 = Median lethal dose
 NOAEL = No observed adverse effect
 STOT = Specific Target Organ Toxicity
 PEC = Predicted effect concentration
 PNEC = Predicted no effect concentration

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