

SECTION 1: IDENTIFICATION OF THE MIXTURE AND OF THE COMPANY

1. Product identifier

Product name: Ferronickel slags; Electric Arc Furnace Slag
Chemical family: inorganic UVCB
Chemical formula: not applicable
Synonyms: Slags Ferronickel Manufg., Electrofurnace Slag, EFS
Trade name : Electrofurnace Slag
CAS number: 69012-29-9
EINECS number: 273-729-7
Annex I index number: Not applicable
REACH Registration number: 01-2119557919-18-0001
UVCB: By-product from the production of ferronickel from a complex ore.
Consists primarily of oxides of iron, calcium, silicon, magnesium and aluminum.

1.2 Relevant identified uses of the substance or mixture and uses advised against

1.2.1 Relevant identified uses

Sandblasting.

1.2.2 Uses advised against

None known

1.3 Details of the supplier of the safety data sheet

Company name: Cunico Resources NV
Street: Haaksbergweg 59,
Postal code: 1102 BR
City / Town: Amsterdam
Region / County: the Netherlands
Phone: 0031205640493
Fax: 0031205640494
E-mail: mlmeijer@cunicomarketing.com
Company web site: <http://www.cunicoresources.com>

Competent person responsible for the SDS:

Title: Mr
First name: Olivier
Last name: Desevedavy
Phone: 0038976436023
E-mail: olivier.d@feni.com.mk
Organization name: FENI Industries
Department: Quality Control
Address: PO BOX 53
Postal code: 1430
City / Town: Kavadarci
Country: Republic of Macedonia

1.4 Emergency telephone number

Company number and office hours: FENI Industries: +38943421440 (08:00-16:00)

Emergency numbers (poison control centers):

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture according to Regulation (EC) No. 1272/2008 (CLP/GHS)

Not Dangerous

2.2 Label elements

2.2.1 Labeling according to Regulation (EC) No. 1272/2008 (CLP/GHS)

Not applicable

2.3 Other hazards

The mixture does not meet the criteria for a PBT or vPvB classification.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 UVCB Substance

Most common ingredients:

Ingredient	EC nb	CAS nb	Content	Classification (CLP)
Silicon Dioxide	231-545-4	1309-48-4	30 - 50%	-
Iron	231-096-4	7439-89-6	15 - 35%	-
Magnesium Oxide	215-171-9	1309-48-4	13 – 20%	-
Aluminium Oxide	215-691-6	1344-28-1	1 – 4%	-
Chromium (III) Oxide	215-160-9	1308-38-9	1.4 – 3%	-
Nickel	231-111-4	7440-02-0	< 0.15%	Skin sens. cat 1; Carc. cat.2, STOT RE cat. 1
Sulfur	231-722-6	7704-34-9	0.1%	
Calcium oxide	215-138-9	1307-78-8	3 – 5%	Skin irrit. 2

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General advice: If wounded, cleanse thoroughly, in order to remove any particles. If medical advice is needed, have product label or safety data sheet available.

Following inhalation: Remove to fresh air. Clear dust in throat and nasal passages. Contact a physician if irritation persists or develops later.

Following skin contact: Wash with cool water and a pH-neutral soap or mild detergent intended for use on skin. Seek medical treatment in all cases of prolonged direct exposure to wet product or prolonged wet skin exposure to dry product.

Following eye contact: Immediately flush eye(s) with plenty of clean water for at least 15 minutes, while holding the eyelid(s) open. Beyond flushing, do not attempt to remove material from the eye(s). Contact a physician if irritation persists or later develops

After ingestion: Do not induce vomiting. If person is conscious, give large quantity of water. Seek medical attention.

4.2. Most important symptoms and effects, both acute and delayed

If generated, particles may cause slight irritation to eyes.

4.3 Indication of any immediate medical attention and special treatment needed

No special requirements.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

5.1.1 Suitable extinguishing media

Any type to be selected according to materials burning in the immediate area.

5.1.2 Unsuitable extinguishing media

No special requirements.

5.2 Special hazards arising from the substance or mixture

None known

Advice for firefighters

Special protective equipment: None specific needed. Wear protective equipment if required for other materials within the immediate vicinity.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

EFS inhalable dust may be generated during prolonged storage in not sufficiently ventilated place.

Avoid generation of dusty atmospheres. Do not inhale dusts.

Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse.

Use appropriate personal protective equipment where required, according to Section 8, to avoid inhalation and skin and eye contact with the dust.

6.2 Environmental precautions

No need of specific measure.

6.3 Methods and materials for containment and cleaning up

Use appropriate tools to collect the spilled material and put it in appropriate storage areas.

6.4 Reference to other sections

See section 8 for personal protective equipment and sections 11 and 12 for health and environmental effects related to EFS.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures

Prevent the generation of inhalable dusts. Wear appropriate nationally approved respirators if handling is likely to cause the concentration limits of airbourne EFS to exceed the locally prescribed exposure limits. Wear suitable protective clothing and gloves if handling the substance directly.

7.1.2 Advice on general occupational hygiene

Do not eat, smoke or drink when handling the substance. Do not inhale dusts, where present.

7.2 Conditions for safe storage, including any incompatibilities

Keep in the container supplied and keep the container closed when not in use. Containers should be stored under cover in a clean and dry environment.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

The following **sources** of information on Occupational Exposure Limits from Member States were used:

<http://osha.europa.eu/en/topics/ds/oel/index.stm/members.stm> .

http://www.dguv.de/ifa/en/gestis/limit_values/index.jsp

The material is not dangerous, so the applicable limits for total dust (inhalable and respirable are used). The following table includes current national limit values.

Country	Current OELs (mg/m ³) - 8 hours	
	Inhalable dust	Respirable dust
Germany (AGS)	10	3
Belgium	10	3
Greece	10	5
Spain	10	3

* Provided that it does not contain crystalline silica

8.1.1 PNECs and DNELs

Source: Ferronickel Slags CSR

DNEL	Inhalable (mg/m ³)	Respirable (mg/m ³)
Worker Long-Term systemic (inhalation)	10	5
Worker Long-Term local (inhalation)	10	5
General population (long-term)	50µg/m ³ (national particulates limit)	

Table: Calculated DNEL values for ferronickel slags

Compartment	PNEC
freshwater	10 g slag/L
marine water	23.8 g slag/L

Table: Calculated PNEC values for ferronickel slags

8.2 Exposure controls

8.2.1 Occupational Exposure Controls

Good industrial hygiene should be followed. Avoid skin and eye contact and inhalation of dust. In case dust is generated so that exposure cannot be maintained below recommended exposure limits the following respiratory and eye protection should be used.

8.2.2 Personal Protective Equipment

Respiratory Protection: If dust is generated or required for other reasons, use respiratory mask.

Eye Protection: Safety glasses with side shields should be worn as minimum protection. Dust goggles should be worn when excessive (visible) dust conditions are present or anticipated.

Hand and Skin Protection: Protective gloves, shoes and protective clothing that are impervious to water should be worn to avoid contact with skin.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Property	Value
Physical state at 20°C and 101.3 kPa	Solid Colour: brown solid Odourless
Melting / freezing point	?
Boiling point	Not determined since melting point >300°C
Specific Gravity	3 – 3.5 t/m ³
Vapour pressure	Not determined since melting point > 300°C
Surface tension	NOT APPLICABLE Surface tension does not need to be determined because EFS is not designed or anticipated to have surfactant properties.
Water solubility	Practically Insoluble
Partition coefficient n- octanol /water (log value)	NOT APPLICABLE The partition coefficient does not need to be determined for inorganic substances.
Flash point	NOT APPLICABLE The flash point does not need to be determined because nickel is inorganic.
Flammability	Non-flammable
Explosive properties	Non-explosive
Self-ignition temperature	NOT APPLICABLE Self-ignition temperature does not need to be determined because EFS is inorganic
Oxidizing properties	Non-oxidizing because it does not contain chemical groups associated with oxidizing properties.
Granulometry	Total PM ₁₀ are less than 2% w/w.
Stability in organic solvents and identity of relevant degradation products	NOT APPLICABLE Stability in organic solvents and identity of relevant degradation products is not an applicable endpoint for inorganic substances.
Dissociation constant	NOT APPLICABLE It is a UVCB substance of various constituents. There is no suitable analytical method and it is not possible to calculate the pKa of the constituents. Also, it is inorganic.
Viscosity	NOT APPLICABLE Viscosity data is not required since EFS is a solid.

9.2 Other information

Not applicable.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

Stable under normal conditions.

10.2 Chemical stability

Chemically stable substance under normal conditions.

10.3 Possibility of hazardous reactions

Stable under normal conditions.

10.4 Conditions to avoid

None known (to be examined)

10.5 Incompatible materials

None known

10.6 Hazardous decomposition products

Respirable dust particles may be generated when the product is handled

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

The following table contains data on the toxicological properties of Ferronickel Slags, based on individual tests or information about the constituents.

Toxicity endpoints	Description of effects
Toxicokinetics	There is low potential for bioaccumulation of ferronickel slags.
Acute toxicity	ORAL: LD ₅₀ >2000 MG/KG BW DERMAL: No studies have been found on acute toxicity by the dermal route. Dermal absorption is low, so no toxicity is expected. INHALATION: NOAEC (66min) >= 5.16 mg/m ³ in air <i>EFS is not classified for acute toxicity</i>
Irritation/corrosion	SKIN: Non irritant. EYE: Non irritant. <i>EFS is not classified for irritation/corrosion</i>
Sensitization	<i>EFS is not classified as a dermal sensitizer.</i> <i>EFS is not classified as a respiratory sensitizer.</i>
STOT - Repeated dose toxicity	ORAL: not relevant DERMAL: not relevant INHALATION: LOAEC = 25 mg/m ³ air (lung) derived from nickel effects. <i>EFS is not classified for Repeated dose toxicity based on its constituents.</i>
Mutagenicity	<i>EFS is not mutagenic.</i>
Carcinogenicity*	INHALATION: Nickel metal has been consistently negative for respiratory carcinogenicity in human studies and was also negative in an animal inhalation study. This animal study demonstrated no carcinogenicity in rats and supersedes previous studies, indicating no carcinogenic classification is warranted for nickel metal. Nickel monoxide is a recognised 1A carcinogen but its content in the slag is always below the level of 0.1% w/w ORAL: None. <i>EFS is not classified as a carcinogen based on its constituents</i>
Reproductive toxicity	LOAEC = 650mg/m ³ (fertility, inhalation exposure) derived from nickel effects <i>Ferronickel slags is not a reproductive toxicant.</i>

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

EFS is not classified as an aquatic hazard, based on its content of Nickel and its respective aquatic toxicity. Additional tests on EFS showed no direct effect on aquatic organisms.

The following data refers to results for tests on Ferronickel slags and for some of its constituents, mainly Nickel and Chromium (III).

EcoToxicity endpoints	Description of effects
Aquatic toxicity	Ecotoxicity Reference Values (ERV) for Nickel substances : Acute: 120µg Ni/L (pH 6), 68µg Ni/L (pH 8) Chronic: 2.4µg Ni/L <i>EFS is not classified for aquatic toxicity based on its Nickel content</i>
Short-term toxicity to fish	<i>No effect of Ferronickel slags was determined on a long-term exposure test.</i> Fish 96h (freshwater): 20.8 mg Ni/L [O.mykiss] (mortality EC50).
Short-term toxicity to crustaceans	<i>No effect of Ferronickel slags was determined on a short-term exposure test.</i>
Toxicity to algae and aquatic plants	<i>No effect of Ferronickel slags to algae was determined on a 48h exposure test</i> Algae growth rate (freshwater): Range of 12.6 µg Ni/L [Scenedesmus accuminatus] to 115.3 µg Ni/L [Pseudokirchnerella subcapitata] Algae growth (marine): Range from 122.7 µg Ni/L [Skeletonema costatum] to 27481 µg Ni/L [Dunaliella tertiolecta]
Long-term toxicity to fish	<i>No effect of Ferronickel slags was determined on a long-term exposure test.</i> Fish (freshwater): Range of 40 µg Ni/L [Brachydanio rerio for hatchability] to 1548 µg Ni/L [Oncorhynchus mykiss for growth] Fish EC10 (marine): Range from 3599 µg Ni/L [Atherinops affinis growth] to 20760 µg Ni/L [Cyprinodon variegatus growth]
Long-term toxicity to crustaceans	<i>No effect of Ferronickel slags was determined on a long-term exposure.</i> Invertebrates population growth rate (15 species) (freshwater): Range of 2.98 µg/L [Cladoceran species] (mortality) to 1379 µg/L [Brachionus calyciflorus] Invertebrates (marine): Range from 22.1 µg Ni/L [Mysidopsis intii] (mortality, larvae completing metamorphosis) to 335 µg Ni/L [Strongylocentrotus purpuratus] (development)
Toxicity to microorganisms	All waste from the uses of the substance is collected and recycled in the process or used again. No quantities are allowed to reach STP.
Toxicity to soil macro-organisms	Invertebrates (chronic): Range from 100 mg Ni/kg [Eisenia veneta] (reproduction) to 1140 mg Ni/kg [Eisenia fetida reproduction]
Toxicity to terrestrial plants	Plants EC50 (4 d) values (acute): Range from ≥54.5 mg/kg soil d.w. to ≤1928.2 mg/kg [Hordeum vulgare root elongation] Plants (11 species) (chronic): Range from 13 mg Ni/kg [Spinacea oleracea total yield] to 1127 mg Ni/kg [Hordeum vulgare root yield]
Toxicity to soil micro-organisms	Microbial processes (12 processes) (chronic): Range from 28 mg Ni/kg [nitrification] to 2542 mg Ni/kg [respiration] Enzyme activity in soil (chronic): Range from 7.9 mg Ni/kg [dehydrogenase] to 7084 mg Ni/kg [arylsulfatase activity] Microbial species growth (13 species) (chronic): Range from 13 mg Ni/kg [Aspergillus clavatus] to 530 mg Ni/kg for [Trichoderma viride]
Sediment toxicity	No effects of EFS were observed on sediment organisms (freshwater) in concentrations up to 1000mg/m ³ (further information to be reviewed)

12.2 Persistence and degradability

Due to the inorganic character of the substance and the absence of chemical groups susceptible to hydrolysis, biodegradation is not a concern. Elemental sulphur which is partially leached out by water and dissociates forming HS^- , HSO_4^- and SO_4^{2-} the species that predominate in the environment that might be found in nature. However, the elemental content of sulphur in the ferronickel slag is not significant (maximum 0,6 w/w %) therefore is not expected pH contribution to the local environment from the sulphur ions, which are integrated into the various mineral species present in the environment.

12.3 Bioaccumulative potential

Species	BAF (L/kg)	Source
Aquatic		
C. Edule	1631 l/Kg	Boyden 1975
Other aquatic organisms : Bivalves, fish, cephalopods	270 L/kg	Mc Geer et al., 2003
Terrestrial		
Earthworm	0.3 (Geometric mean of multiple BAF)	Ma 1982; Neuheuser et al., 1995; Janssen et al., 1997a; Jacques Whitford Limited, 2005; Beyer et al., 1982; Gish and Christensen 1973

The table above contains Nickel BAFs for certain species. Based on the available data it is concluded that, though nickel does bioaccumulate in aquatic biota, the bioaccumulation factors are generally low and apparently nickel from ferronickel slags does not become magnified along food chains. The BAF observed for *C.Edule* is deemed not representative for other bivalves or aquatic organisms.

12.4 Mobility in soil

EFS is practically insoluble to water.

12.5 Results of PBT and vPvB assessment

The PBT and vPvB criteria of Annex XIII to the Regulation do not apply to inorganic substances. Ferronickel slags is not PBT or vPvB.

12.6 Other adverse effects

Not applicable

For an overview of PNECs check section 8.1.1 and for more information on how the environmental classification was derived contact your supplier.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Recover if possible. Waste characterization and disposal according to local, state national or European waste legislation. Disposal remains the responsibility of the waste treatment operator.

SECTION 14: TRANSPORT INFORMATION

Land Transport (ADR-RID): Not Regulated.

Inland Waterway Transport (ADN): Not Regulated.

Marine Transport (IMDG Code): Not Regulated.

Air Transport (ICAO - IATA): Not Regulated.

U.S. Dept. of Transportation Regulations: Not Regulated.

Canadian Transportation of Dangerous Goods Act: Not Regulated.

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance

15.1.1 Worldwide Chemical Inventories

EINECS (EU): 273-729-7	MITI (Japan): all components are listed in Handbook
TSCA (USA): all components are listed in TSCA	ECL(Korea): all components are listed in ECL
DSL(Canada): all components are listed in DSL	PICCS (Philippines): all components are listed in PICCS
WHMIS Classification:	PICCS
AICS (Australia): all components are listed in AICS	IECSC(China): all components are listed in IECSC

15.1.2 Other regulatory information

Regulation (EC) No 689/2008 concerning the export and import of dangerous chemicals: Not relevant
Restrictions under Title VIII of Regulation (EC) No 1907/2006: Not relevant

15.2. Chemical safety assessment

The Chemical Safety Assessment that was performed on the substance showed that it has no physicochemical, toxicological or ecotoxicological hazards.

SECTION 16: OTHER INFORMATION

16.1 Indication of changes

This is the first version of the Safety Data Sheet for EFS.

16.2 Abbreviations used: on request via your supplier

BAF	Bioaccumulation factor
CAS	Chemical Abstract Services- Registry Numbers
DMEL	Derived minimum effect level
DNEL	Derived no effect level
EINECS	European Inventory of Existing Commercial Chemical Substances
L(E)C50	Median lethal (L) concentration; the concentration causing 50 % lethality (L) or adverse effects (E).
LD50	Median lethal dose; the dose causing 50 % lethality
LOAEC	Low observed adverse effects concentration
LOAEL	Low observed adverse effect level
NOEC	No observed effects concentration
NOAEC	No observed adverse effects concentration
NOAEL	No observed adverse effect level
OEL	Occupational exposure limit
PBT	Persistent, bioaccumulative, toxic
PNEC	Predicted no effect concentration
STEL	Short term exposure level
TWA	Time-weighted average exposure

16.3 Key literature references and sources of data

1. European Agency for safety and health at work - <http://osha.europa.eu/en/topics/ds/oel/index.stm/members.stm>
2. IFA, GESTIS database – International limit values for chemical agents - http://www.dguv.de/ifa/en/gestis/limit_values/index.jsp
3. European Union Risk Assessment Report – Nickel and Nickel Compounds, 2008

16.4 Procedure used to derive the classification for the mixture according to art.9 of Regulation 1272/2008 (CLP)

Ferronickel slags was not fully tested as a mixture. For some potential hazards, tests, according to the requirements of REACH and CLP regulations were performed, while on others, the toxicity of individual constituents were examined. In either case, it was concluded that no classification is required. Although ferronickel slags are a UVCB substance, it was attempted to approach its classification using mixture rules, but the Nickel content of the substance was very low, so no classification arose.

16.5 Full labeling information according to CLP

Not applicable

16.6 Training advice for personnel

No special training is required of the personnel working with the material. Everybody must be fully informed about the necessary procedures (regular and emergency) and precaution measures that are described in the SDS (main body and exposure scenarios). These measures and procedures must be followed every time the material is being handled.

16.7 Further information

Summary of carcinogenicity for nickel

Inhalation carcinogenicity

Nickel metal has been consistently negative for respiratory carcinogenicity in human studies and was also negative in a recent animal inhalation study. These carcinogenicity results are consistent with the Nickel ion bioavailability model for cancer. This model indicates that it is the bioavailability of Nickel ion at nuclear sites of target respiratory cells that will be associated with tumor induction. There are many factors that can affect the bioavailability of Ni ion from nickel metal (e. g., toxicity, deposition, clearance, cellular uptake and dissolution) and which can explain the lack of carcinogenicity of nickel metal in animals.

Nickel metal carries a classification as a suspect carcinogen. It is classified as a Category 3; R40 carcinogen under EU Classification & Labeling; Category 2; H351 carcinogen under GHS and CLP; and Group 2B carcinogen (possible human carcinogen) by IARC (1990). These classifications were based on the lack of human evidence of carcinogenicity, but the presence of positive results for tumor induction in animals after injection or intratracheal instillation. In the late 1990s, the lack of a robust inhalation study led the EU to mandate the conduct of such a study (conclusion (i), EURL, 2008). The recent animal study by the relevant route of exposure (inhalation) showed no increased respiratory cancer incidence in animals exposed to nickel metal powder. This study (Oller et al., 2008) supersedes the results from injection/instillation studies and indicates that no carcinogen classification is warranted for nickel metal.

Oral carcinogenicity

The lack of oral carcinogenic potential for nickel sulfate hexahydrate can be extrapolated to other soluble and insoluble nickel compounds. Nickel sulfate hexahydrate represents a worst-case scenario for systemic absorption of nickel since nickel sulfate hexahydrate is readily solubilized in gastrointestinal fluid and results in the highest systemic absorption of Ni (II) ions compared to less soluble nickel-containing substances (Ishimatsu et al., 1995). Rats are the best rodent model for studying the oral carcinogenicity of nickel since they have been demonstrated to be sensitive to the carcinogenic effects of nickel by other routes of exposure (e. g., inhalation).

Disclaimer:

- *This Safety Data Sheet (SDS) is prepared with our best knowledge and with our best faith. It is based on information that is currently under discussion. The information in this SDS will be updated when final decisions are reached;*
- *CUNICO RESOURCES NV provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. Furthermore, this safety data sheet (including its Annex) is made up based on the legal requirements as set by EC 1907/2006 (REACH) based on information as is available per December 1, 2010. Further information received following the time scale as foreseen by REACH and the guidance policies as described in the REACH Implementation programs will be added when it becomes available.*