KW-T617

Material Safety Data Sheet

In Accordance with MOEL Public notice No 2020-130
MSDS Number: AA06900-0000000559
Issue date: 6/28/1996 Revision date: 1/16/2025 Version: 8.0

1. Chemical product and company identification

1.1. Product identifier

Product form : Article
Trade name : KW-T617

1.2. Recommended uses and restrictions

1.2.1. Recommended use

Welding and soldering products, flux products.

1.2.2. Restrictions on use

1.2.3. Use Categories

35 - Welding and soldering products, flux products

1.3. Supplier information

- Supplier
Company : KISWEL
Address : (51544) South Korea 704, Gongdan-ro, Seongsan-gu, Changwon-si, Gyeongnam, Korea
Tel. : 055)269-7200
Fax : 055)266-4487

2. Hazards identification

2.1. Classification of the substance or mixture

Respiratory sensitisation, Category 1	H334
Skin sensitisation, Category 1	H317
Carcinogenicity, Category 2	H351
Specific target organ toxicity - Repeated exposure, Category 1	H372
Hazardous to the aquatic environment – Chronic Hazard, Category 4	H413

2.2. Label elements

2.2.1. Hazard pictograms (GHS KR)



2.2.2. Signal word (GHS KR)

Danger.

2.2.3. Hazard statements (GHS KR)

H317 - May cause an allergic skin reaction.
H334 - May cause allergic reactions, asthma or shortness of breath and etc if inhaled.
H351 - Suspected of causing cancer (Inhalation).
H372 - Causes damage to organs (respiratory system) through prolonged or repeated exposure (Inhalation).
H413 - May cause long lasting harmful effects to aquatic life.

2.2.4. Precautionary statements (GHS KR)

Precaution:

P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P260 - Do not breathe gas, dust, fume.
P261 - Avoid breathing gas, dust, fume.
P264 - Wash hands, forearms and face thoroughly after handling.

P270 - Do not eat, drink or smoke when using this product.
P272 - Contaminated work clothing should not be allowed out of the workplace.
P273 - Avoid release to the environment.
P280 - Wear eye protection, protective clothing, face protection, protective gloves.
P284 - In case of inadequate ventilation wear respiratory protection.

Treatment:

P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P308+P313 - IF exposed or concerned: Get medical attention.
P314 - Get medical attention if you feel unwell.
P321 - Take immediate medical attention treatment.
P333+P313 - If skin irritation or rash occurs: Get medical attention.
P342+P311 - If experiencing respiratory symptoms: Call medical institutions, a doctor.
P362+P364 - Take off contaminated clothing and wash it before reuse.

Storage:

P405 - Store locked up.

Disposal:

P501 - Dispose of contents/container according to waste related regulations.

2.3. Hazards - Other hazards which do not result in classification - Hazard Risk

Not applicable

3. Composition/information on ingredients

Product form : Article

Substance name	Other Names	Product identifier number	Concentration (%)
Nickel	Nickel metal / Nickel, elemental / Nickel, metallic / Nickel, metal / C.I. 77775	CAS-No.: 7440-02-0 KECI-No.: KE-25818	45 – 50
Chromium	-	CAS-No.: 7440-47-3 KECI-No.: -	20 – 24
Coblat	-	CAS-No.: 7440-48-4 KECI-No.: -	10 – 15
Molybdenum	Molybdenum metal / Molybdenum, elemental / Molybdenum, metal / Molybdenum, metallic / molybdenum	CAS-No.: 7439-98-7 KECI-No.: KE-25427	8 – 10
Iron	Iron, elemental / Direct reduced Iron / Iron, reduced / Elemental iron / IRON POWDER / iron	CAS-No.: 7439-89-6 KECI-No.: KE-21059	1 – 3
Aluminum	Aluminium / Aluminium metal / Aluminium, metal / Aluminum metal / Aluminum, elemental / Aluminum, metal / C.I. 77000 / CI 77000 / Aluminium powder (stabilised) / Aluminium powder (stabilized) / Aluminium powder / Pigment Metal 1 / Aluminum powder / Aluminium metal, powder / Aluminium powder (pyrophoric) / aluminum	CAS-No.: 7429-90-5 KECI-No.: KE-00881	0.5 – 1.5
Manganese	Manganese, elemental / Manganese metal / manganese	CAS-No.: 7439-96-5 KECI-No.: KE-22999	0.1 – 1

Substance name	Other Names	Product identifier number	Concentration (%)

4. First-aid measures

4.1. First-aid measures after eye contact

Rinse cautiously with water for several minutes.
Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.

4.2. First-aid measures after skin contact

Wash skin with plenty of water.
Take off contaminated clothing.
If skin irritation or rash occurs: Get medical advice/attention.

4.3. First-aid measures after inhalation

Remove person to fresh air and keep comfortable for breathing.
If experiencing respiratory symptoms: Call a poison center or a doctor.

4.4. First-aid measures after ingestion

Rinse mouth.
Call a poison center or a doctor if you feel unwell.

4.5. Other medical advice or treatment

Treat symptomatically.

5. Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Water spray.
Dry powder.
Foam.

Unsuitable extinguishing media : No data available

5.2. Special hazards arising from the substance or mixture

No data available

5.3. Special protective equipment and precautions for fire-fighters

Protection during firefighting : Do not attempt to take action without suitable protective equipment.
Self-contained breathing apparatus.
Complete protective clothing.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Ventilate spillage area.
Do not breathe dust/fume/gas/mist/vapours/spray.
Avoid contact with skin and eyes.
Do not attempt to take action without suitable protective equipment.
For further information refer to section 8: "Exposure controls/personal protection".
Dispose of materials or solid residues at an authorized site.

6.2. Environmental precautions and protective procedures

Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

Collect spillage.
Mechanically recover the product.
Notify authorities if product enters sewers or public waters.

7. Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	:	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear personal protective equipment. Do not breathe dust/fume/gas/mist/vapours/spray. Use only outdoors or in a well-ventilated area. Avoid contact with skin and eyes.
Hygiene measures	:	Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage

Storage conditions	:	Store locked up. Store in a well-ventilated place. Keep container tightly closed. Keep cool.

8. Exposure controls/personal protection

8.1. Occupational Exposure Limits

KW-T617
No data available

Manganese (7439-96-5)	
Korea - Occupational Exposure Limits	
Local name	망간 및 무기 화합물 # Manganese&Inorganic compounds, as Mn
ISHA OEL TWA	1 mg/m³ 1 mg/m³ (흄) # (Fume)
ISHA OEL STEL	3 mg/m³ (흄) # (Fume)
ISHA PEL TWA	1 mg/m³
Regulatory reference	고용노동부고시 제2020-48호 # MOEL Public Notice. No. 2020-48
China - Occupational Exposure Limits	
OEL PC-TWA	0.15 mg/m³
OEL PC-TWA (Highly Toxic Goods)	0.15 mg/m³ (dust and fume)
OEL PC-STEL (Highly Toxic Goods)	0.45 mg/m³ (dust and fume)
Catalogue of Occupational Hazard Factors	Category 3 - Chemicals
India - Occupational Exposure Limits	
PEL (OEL TWA)	1 mg/m³ (fume)

Manganese (7439-96-5)	
PEL (OEL STEL)	0.03 mg/m³ (fume)
PEL (OEL C)	5 mg/m³ (dust)
Indonesia - Occupational Exposure Limits	
NAB (OEL TWA)	0.1 mg/m³ (inhalable particulate) 0.02 mg/m³ (respirable particulate)
Chemical category	A4 - not classifiable as a human carcinogen
Singapore - Occupational Exposure Limits	
PEL (OEL TWA)	1 mg/m³ (dust and fume)
OEL STEL	3 mg/m³ (fume)
Singapore - BTLV	
BTLV	50 µg/l Parameter: Manganese - Medium: urine
Taiwan - Occupational Exposure Limits	
OEL TWA	1 mg/m³ (category C3 special chemical-fume)
OEL STEL	2 mg/m³ (category C3 special chemical-fume)
OEL C	5 mg/m³ (category C3 special chemical)
Vietnam - Occupational Exposure Limits	
OEL TWA	0.3 mg/m³
OEL STEL	0.6 mg/m³
Australia - Occupational Exposure Limits	
OES TWA	1 mg/m³ (dust and fume)
OES STEL	3 mg/m³ (fume)
USA - ACGIH - Occupational Exposure Limits	
ACGIH OEL TWA	0.02 mg/m³ (respirable particulate matter) 0.1 mg/m³ (inhalable particulate matter)
ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA - IDLH - Occupational Exposure Limits	
IDLH	500 mg/m³
USA - NIOSH - Occupational Exposure Limits	
NIOSH REL TWA	1 mg/m³ (fume)
NIOSH REL STEL	3 mg/m³
USA - OSHA - Occupational Exposure Limits	
OSHA PEL C	5 mg/m³ (fume)

Nickel (7440-02-0)	
Korea - Occupational Exposure Limits	
Local name	니켈 (금속) # Nickel (Metal)
ISHA OEL TWA	1 mg/m³ (metal)
ISHA PEL TWA	0.2 mg/m³
Remark (KR)	발암성 2 # Carcinogenicity 2
Regulatory reference	고용노동부고시 제2020-48호 # MOEL Public Notice. No. 2020-48

Nickel (7440-02-0)	
China - Occupational Exposure Limits	
OEL PC-TWA	1 mg/m³
Chemical category	Possibly carcinogenic to humans
OEL PC-TWA (Highly Toxic Goods)	1 mg/m³
OEL PC-STEL (Highly Toxic Goods)	2.5 mg/m³
Catalogue of Occupational Hazard Factors	Category 3 - Chemicals
Indonesia - Occupational Exposure Limits	
NAB (OEL TWA)	1.5 mg/m³ (inhalable particulate)
Chemical category	A5 - not suspected as human carcinogen
Singapore - Occupational Exposure Limits	
PEL (OEL TWA)	1 mg/m³
Taiwan - Occupational Exposure Limits	
OEL TWA	1 mg/m³
OEL STEL	2 mg/m³
Thailand - Occupational Exposure Limits	
OEL TWA	1 mg/m³
Vietnam - Occupational Exposure Limits	
OEL TWA	0.05 mg/m³
OEL STEL	0.25 mg/m³
Australia - Occupational Exposure Limits	
OES TWA	1 mg/m³
USA - ACGIH - Occupational Exposure Limits	
ACGIH OEL TWA	1.5 mg/m³ (inhalable particulate matter)
ACGIH chemical category	Not Suspected as a Human Carcinogen
USA - ACGIH - Biological Exposure Indices	
BEI	5 µg/l Parameter: Nickel - Medium: urine - Sampling time: post-shift at end of workweek (background)
USA - IDLH - Occupational Exposure Limits	
IDLH	10 mg/m³
USA - NIOSH - Occupational Exposure Limits	
NIOSH REL TWA	0.015 mg/m³
USA - OSHA - Occupational Exposure Limits	
OSHA PEL TWA	1 mg/m³

Chromium (7440-47-3)	
Korea - Occupational Exposure Limits	
Local name	크롬광 가공(크롬산) # Chromite ore processing (Chromate), as Cr
ISHA OEL TWA	0.05 mg/m³
Remark (KR)	발암성 1A # Carcinogenicity 1A
Regulatory reference	고용노동부고시 제2020-48호 # MOEL Public Notice. No. 2020-48

Molybdenum (7439-98-7)	
Korea - Occupational Exposure Limits	
Local name	몰리브덴 (불용성화합물) # Molybdenum (Insoluble compounds)
ISHA OEL TWA	10 mg/m³ 흡입성 # (Inhalable fraction) 5 mg/m³ 호흡성 # (Respirable fraction)
Regulatory reference	고용노동부고시 제2020-48호 # MOEL Public Notice. No. 2020-48
Indonesia - Occupational Exposure Limits	
NAB (OEL TWA)	5 mg/m³ (respirable particulate)
Chemical category	A3 - confirmed animal carcinogen
Australia - Occupational Exposure Limits	
OES TWA	10 mg/m³
USA - ACGIH - Occupational Exposure Limits	
ACGIH OEL TWA	10 mg/m³ (inhalable particulate matter) 3 mg/m³ (respirable particulate matter)
USA - IDLH - Occupational Exposure Limits	
IDLH	5000 mg/m³

Iron (7439-89-6)	
Korea - Occupational Exposure Limits	
Local name	철염(가용성) # Iron salts (Soluble, as Fe)
ISHA OEL TWA	1 mg/m³
Regulatory reference	고용노동부고시 제2020-48호 # MOEL Public Notice. No. 2020-48
China - Occupational Exposure Limits	
Catalogue of Occupational Hazard Factors	Category 1 - Dusts
Indonesia - Occupational Exposure Limits	
NAB (OEL TWA)	1 mg/m³

Coblat (7440-48-4)	
Korea - Occupational Exposure Limits	
Local name	코발트및 그 무기화합물 # Cobalt and inorganic compounds
ISHA OEL TWA	0.02 mg/m³
Remark (KR)	발암성 2 # Carcinogenicity 2
Regulatory reference	고용노동부고시 제2020-48호 # MOEL Public Notice. No. 2020-48

Aluminum (7429-90-5)	
Korea - Occupational Exposure Limits	
Local name	알루미늄 # Aluminum
ISHA OEL TWA	2 mg/m³ (가용성 염) # (Soluble salts) 10 mg/m³ (금속분진) # (Metal dust) 2 mg/m³ (알킬) # (Alkyls) 5 mg/m³ (용접 흄) # (Welding fumes) 5 mg/m³ (피로파우더) # (Pyropowders)
Regulatory reference	고용노동부고시 제2020-48호 # MOEL Public Notice. No. 2020-48

Aluminum (7429-90-5)	
China - Occupational Exposure Limits	
OEL PC-TWA	3 mg/m³ (total dust)
Catalogue of Occupational Hazard Factors	Category 1 - Dusts
Indonesia - Occupational Exposure Limits	
NAB (OEL TWA)	10 mg/m³ (dust) 1 mg/m³ (respirable particulate)
Chemical category	A4 - not classifiable as a human carcinogen
Singapore - Occupational Exposure Limits	
PEL (OEL TWA)	10 mg/m³ (dust)
Thailand - Occupational Exposure Limits	
OEL TWA	15 mg/m³ (inhalable dust) 5 mg/m³ (respirable dust)
Vietnam - Occupational Exposure Limits	
OEL TWA	2 mg/m³
OEL STEL	4 mg/m³
Australia - Occupational Exposure Limits	
OES TWA	10 mg/m³ (dust) 5 mg/m³ (welding fume)
USA - ACGIH - Occupational Exposure Limits	
ACGIH OEL TWA	1 mg/m³ (respirable particulate matter)
ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA - NIOSH - Occupational Exposure Limits	
NIOSH REL TWA	10 mg/m³ (total dust) 5 mg/m³ (respirable dust)
USA - OSHA - Occupational Exposure Limits	
OSHA PEL TWA	15 mg/m³ (total dust) 5 mg/m³ (respirable fraction)

8.2. Appropriate engineering controls

Appropriate engineering controls : Ensure good ventilation of the work station.
Environmental exposure controls : Avoid release to the environment.

8.3. Personal protection

Respiratory protection

Wear a mask.
[In case of inadequate ventilation] wear respiratory protection.

Eye protection

Safety glasses

Hand protection

Protective gloves

Skin and body protection

Wear suitable protective clothing

Personal protective equipment symbol(s):



9. Physical and chemical properties

a)	Appearance	:	No data available
	Physical state	:	Solid
b)	Odour	:	No data available
c)	Odour threshold	:	No data available
d)	pH	:	No data available
e)	Melting / freezing point	:	No data available / Not applicable
f)	Initial boiling point and boiling range	:	No data available
g)	Flash point	:	Not applicable
h)	Evaporation rate	:	No data available
i)	Flammability (solid, gas)	:	Non flammable.
j)	Upper / lower flammability or explosive limits	:	Not applicable
k)	Vapour pressure	:	No data available
l)	Solubility	:	No data available
m)	Vapour density	:	No data available
n)	Relative density	:	No data available
o)	Partition coefficient n-octanol/water (Log Kow)	:	No data available
p)	Auto-ignition temperature	:	Not applicable
q)	Decomposition temperature	:	No data available
r)	Viscosity, kinematic	:	Not applicable
	Viscosity, dynamic	:	No data available
s)	Molecular mass	:	No data available

10. Stability and reactivity

10.1. Chemical stability and Possibility of hazardous reactions

The product is non-reactive under normal conditions of use, storage and transport.
Stable under normal conditions.
No dangerous reactions known under normal conditions of use.

10.2. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

10.3. Incompatible materials

No data available

10.4. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11. Toxicological information

11.1. Information on exposure routes

Oral	:	Not classified
Skin and eyes contact	:	Skin sensitization - May cause an allergic skin reaction.
Inhalation	:	Respiratory sensitization - May cause allergic reactions, asthma or shortness of breath and etc if inhaled.

11.2. Health hazards

Acute toxicity (oral):

Not classified

Acute toxicity (dermal):

Not classified

Acute toxicity (inhalation):

Not classified

Manganese (7439-96-5)	
LD50 oral rat	> 2000 mg/kg bodyweight Animal: rat, Animal sex: female, Guideline: OECD Guideline 420 (Acute Oral Toxicity - Fixed Dose Method), Guideline: EU Method B.1 bis (Acute Oral Toxicity - Fixed Dose Procedure)
LC50 Inhalation - Rat	> 5.14 mg/l air Animal: rat, Guideline: OECD Guideline 403 (Acute Inhalation Toxicity), Guideline: EU Method B.2 (Acute Toxicity (Inhalation))
LC50 Inhalation - Rat (Dust/Mist)	> 5.14 mg/l Source: ECHA

Nickel (7440-02-0)	
LD50 oral rat	> 9000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 401 (Acute Oral Toxicity)
LC50 Inhalation - Rat	> 10.2 mg/l (Exposure time: 1 h)

Chromium (7440-47-3)	
LD50 oral rat	> 5000 mg/kg Source: ECHA
LC50 Inhalation - Rat	> 5.41 mg/l air Animal: rat, Guideline: OECD Guideline 403 (Acute Inhalation Toxicity)
LC50 Inhalation - Rat (Dust/Mist)	> 5.41 mg/l Source: ECHA

Molybdenum (7439-98-7)	
LD50 oral rat	> 2000 mg/kg Source: ECHA
LD50 dermal rat	> 2000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 402 (Acute Dermal Toxicity)
LD50 dermal rabbit	> 2000 mg/kg Source: ECHA
LC50 Inhalation - Rat	> 5.84 mg/l/4h
LC50 Inhalation - Rat (Dust/Mist)	> 3.92 mg/l Source: ECHA

Iron (7439-89-6)	
LD50 oral rat	98600 mg/kg bodyweight Animal: rat, Animal sex: male, Guideline: OECD Guideline 401 (Acute Oral Toxicity)
LC50 Inhalation - Rat	> 250 mg/m³ air (6 h, Rat, Male, Experimental value, Inhalation (dust))

Coblat (7440-48-4)	
LD50 oral rat	≈ 550 mg/kg bodyweight Animal: rat, Animal sex: female, Guideline: OECD Guideline 425 (Acute Oral Toxicity: Up-and-Down Procedure), 95% CL: 215,9 - 1140
LD50 dermal rat	> 2000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 402 (Acute Dermal Toxicity)

LC50 Inhalation - Rat	≤ 0.05 mg/l air Animal: rat, Animal sex: male, Guideline: OECD Guideline 436 (Acute Inhalation Toxicity: Acute Toxic Class Method)
LC50 Inhalation - Rat (Dust/Mist)	≤ 0.05 mg/l Source: ECHA

Aluminum (7429-90-5)	
LD50 oral rat	> 15900 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 401 (Acute Oral Toxicity)
LC50 Inhalation - Rat	> 0.888 mg/l air Animal: rat, Animal sex: male, Guideline: OECD Guideline 403 (Acute Inhalation Toxicity)
LC50 Inhalation - Rat (Dust/Mist)	> 0.888 mg/l Source: ECHA

Skin corrosion/irritation:

Not classified

Serious eye damage/irritation:

Not classified

Respiratory sensitization:

May cause allergic reactions, asthma or shortness of breath and etc if inhaled.

Skin sensitization:

May cause an allergic skin reaction.

Carcinogenicity:

Suspected of causing cancer (Inhalation).

Nickel (7440-02-0)	
IARC group	2B - Possibly carcinogenic to humans

Chromium (7440-47-3)	
IARC group	3 - Not classifiable

Coblat (7440-48-4)	
IARC group	2B - Possibly carcinogenic to humans

Mutagenicity:

Not classified

Reproductive toxicity:

Not classified

Aluminum (7429-90-5)	
NOAEL (animal/male, F0/P)	1000 mg/kg bodyweight Animal: rat, Animal sex: male, Guideline: OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test)

STOT-single exposure:

Not classified

Coblat (7440-48-4)	
STOT-single exposure	May cause respiratory irritation.

STOT-repeated exposure:

Causes damage to organs (respiratory system) through prolonged or repeated exposure (Inhalation).

Nickel (7440-02-0)	
LOAEC (inhalation, rat, dust/mist/fume, 90 days)	0.004 mg/l air Animal: rat, Guideline: OECD Guideline 412 (Subacute Inhalation Toxicity: 28-Day Study)
STOT-repeated exposure	Causes damage to organs through prolonged or repeated exposure.

Chromium (7440-47-3)	
LOAEC (inhalation, rat, dust/mist/fume, 90 days)	≥ 0.0044 mg/l air Animal: rat, Guideline: OECD Guideline 413 (Subchronic Inhalation Toxicity: 90-Day Study)

Molybdenum (7439-98-7)	
NOAEC (inhalation, rat, dust/mist/fume, 90 days)	> 0.1 mg/l air Animal: rat, Guideline: OECD Guideline 413 (Subchronic Inhalation Toxicity: 90-Day Study)
STOT-repeated exposure	May cause damage to organs through prolonged or repeated exposure.

Coblat (7440-48-4)	
LOAEC (inhalation, rat, dust/mist/fume, 90 days)	0.31 mg/l air Animal: rat
NOAEL (oral, rat, 90 days)	3 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 408 (Repeated Dose 90-Day Oral Toxicity Study in Rodents)

Aluminum (7429-90-5)	
LOAEC (inhalation, rat, dust/mist/fume, 90 days)	0.05 mg/l air Animal: rat, Guideline: OECD Guideline 413 (Subchronic Inhalation Toxicity: 90-Day Study)
NOAEL (subchronic, oral, animal/male, 90 days)	1034 mg/kg bodyweight Animal: dog, Animal sex: male, Guideline: OECD Guideline 409 (Repeated Dose 90-Day Oral Toxicity Study in Non-Rodents)
NOAEL (subchronic, oral, animal/female, 90 days)	1087 mg/kg bodyweight Animal: dog, Animal sex: female, Guideline: OECD Guideline 409 (Repeated Dose 90-Day Oral Toxicity Study in Non-Rodents)
STOT-repeated exposure	May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard:

Not classified

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Viscosity, kinematic	Not applicable

Manganese (7439-96-5)	
Density	7200 kg/m³

Nickel (7440-02-0)	
Viscosity, kinematic (calculated value) (40 °C)	Not applicable (solid)
Density	8.9 g/cm³ (at 25 °C)
Viscosity, kinematic	Not applicable (solid)
Viscosity, dynamic	Not applicable (solid)

Molybdenum (7439-98-7)	
Density	10.2 g/cm³ (at 20 °C)

Iron (7439-89-6)	
Density	7.87 g/cm³ Type: 'density' Temp.: 20 °C

Coblat (7440-48-4)	
Density	8.86 g/cm³ Type: 'density' Temp.: 20 °C

Aluminum (7429-90-5)	
Density	2.702 g/cm³

12. Ecological information

12.1. Ecotoxicity

Ecology - general : Very toxic to aquatic life.
May cause long lasting harmful effects to aquatic life.

Hazardous to the aquatic environment, short–term (acute) : Not classified

Hazardous to the aquatic environment, long–term (chronic) : May cause long lasting harmful effects to aquatic life.

Manganese (7439-96-5)	
LC50 - Fish [1]	> 3.6 mg/l Test organisms (species): Oncorhynchus mykiss (previous name: Salmo gairdneri)
EC50 - Crustacea [1]	> 1.6 mg/l Test organisms (species): Daphnia magna
EC50 72h - Algae [1]	4.5 mg/l Test organisms (species): Desmodesmus subspicatus (previous name: Scenedesmus subspicatus)
EC50 72h - Algae [2]	2.8 mg/l Test organisms (species): Desmodesmus subspicatus (previous name: Scenedesmus subspicatus)
NOEC (chronic)	1.7 mg/l Test organisms (species): Ceriodaphnia dubia Duration: '8 d'
BCF - Fish [1]	81 (Pisces)
BCF - Other aquatic organisms [1]	300000 (Mollusca)
BCF - Other aquatic organisms [2]	125000 (Crustacea)

Nickel (7440-02-0)	
LC50 - Fish [1]	> 100 mg/l (Exposure time: 96 h - Species: Brachydanio rerio)
LC50 - Fish [2]	1.3 mg/l (Exposure time: 96 h - Species: Cyprinus carpio [semi-static])
EC50 - Crustacea [1]	> 100 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 - Crustacea [2]	1 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
EC50 96h - Algae [1]	0.174 – 0.311 mg/l (Species: Pseudokirchneriella subcapitata [static])
EC50 72h - Algae [1]	0.18 mg/l (Species: Pseudokirchneriella subcapitata)
BCF - Other aquatic organisms [1]	8 – 45 (≤ 4 week(s), Cambarus sp., Flow-through system, Fresh water, Experimental value, Fresh weight)

Chromium (7440-47-3)	
LC50 - Fish [1]	13.9 – 210 mg/l Source: GESTIS
EC50 - Crustacea [1]	13.1 – 14.7 mg/l Test organisms (species): Daphnia magna

Chromium (7440-47-3)	
EC50 72h - Algae [1]	0.1 – 17.8 mg/l Source: GESTIS
Partition coefficient n-octanol/water (Log Kow)	0.23
Partition coefficient n-octanol/water (Log Pow)	0.23 Source: SRC

Molybdenum (7439-98-7)	
LC50 - Fish [1]	609.1 mg/l Source: EHCA
EC50 72h - Algae [1]	289.2 mg/l Source: ECHA
BCF - Fish [1]	260 – 500 (Tilapia rendalli)
Partition coefficient n-octanol/water (Log Pow)	0.23 Source: SRC Access on Jan 2006

Iron (7439-89-6)	
LC50 - Fish [1]	8.65 mg/l Source: ECHA
LC50 - Other aquatic organisms [1]	106.3 mg/l Source: ECHA
EC50 - Crustacea [1]	> 100 mg/l Test organisms (species): Daphnia magna
EC50 - Crustacea [2]	> 10000 mg/l Test organisms (species): Daphnia magna
EC50 72h - Algae [1]	18 mg/l Source: ECHA

Coblat (7440-48-4)	
LC50 - Fish [1]	100 mg/l Source: ECHA
EC50 - Crustacea [1]	> 890 µg/l Test organisms (species): Daphnia magna
EC50 - Crustacea [2]	5.89 mg/l Test organisms (species): Daphnia magna

Aluminum (7429-90-5)	
EC50 72h - Algae [1]	1.05 mg/l Test organisms (species): Pseudokirchneriella subcapitata (previous names: Raphidocelis subcapitata, Selenastrum capricornutum)
EC50 72h - Algae [2]	0.2 mg/l Test organisms (species): Pseudokirchneriella subcapitata (previous names: Raphidocelis subcapitata, Selenastrum capricornutum)

12.2. Persistence and degradability

KW-T617	
Persistence and degradability	Rapidly degradable

Manganese (7439-96-5)	
Persistence and degradability	Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable

Nickel (7440-02-0)	
Persistence and degradability	Biodegradability in soil: not applicable, Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable (inorganic)

Nickel (7440-02-0)	
ThOD	Not applicable (inorganic)

Chromium (7440-47-3)	
Persistence and degradability	Rapidly degradable

Molybdenum (7439-98-7)	
Persistence and degradability	Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable

Iron (7439-89-6)	
Persistence and degradability	Biodegradability in soil: not applicable, Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable

Coblat (7440-48-4)	
Persistence and degradability	Rapidly degradable

Aluminum (7429-90-5)	
Persistence and degradability	Rapidly degradable

12.3. Bioaccumulative potential

Manganese (7439-96-5)	
BCF - Fish [1]	81 (Pisces)
BCF - Other aquatic organisms [1]	300000 (Mollusca)
BCF - Other aquatic organisms [2]	125000 (Crustacea)
Bioaccumulative potential	No bioaccumulation data available.

Nickel (7440-02-0)	
BCF - Other aquatic organisms [1]	8 – 45 (≤ 4 week(s), Cambarus sp., Flow-through system, Fresh water, Experimental value, Fresh weight)
Bioaccumulative potential	Low potential for bioaccumulation (BCF < 500).

Chromium (7440-47-3)	
Partition coefficient n-octanol/water (Log Pow)	0.23 Source: SRC
Partition coefficient n-octanol/water (Log Kow)	0.23

Molybdenum (7439-98-7)	
BCF - Fish [1]	260 – 500 (Tilapia rendalli)

Molybdenum (7439-98-7)	
Partition coefficient n-octanol/water (Log Pow)	0.23 Source: SRC Access on Jan 2006
Bioaccumulative potential	No bioaccumulation data available.

Iron (7439-89-6)	
Bioaccumulative potential	No bioaccumulation data available.

12.4. Mobility in soil

Manganese (7439-96-5)	
Ecology - soil	No (test)data on mobility of the substance available.

Nickel (7440-02-0)	
Surface tension	Not applicable (solid)
Ecology - soil	No (test)data on mobility of the substance available.

Chromium (7440-47-3)	
Partition coefficient n-octanol/water (Log Pow)	0.23 Source: SRC
Partition coefficient n-octanol/water (Log Kow)	0.23

Molybdenum (7439-98-7)	
Partition coefficient n-octanol/water (Log Pow)	0.23 Source: SRC Access on Jan 2006
Ecology - soil	Adsorbs into the soil.

Iron (7439-89-6)	
Surface tension	Not applicable (solid)
Ecology - soil	Adsorbs into the soil.

12.5. Other adverse effects

Ozone : Not classified
Other adverse effects : No data available

13. Disposal considerations

13.1. Disposal method

Waste treatment methods : Dispose of contents/container in accordance with licensed collector’s sorting instructions.

13.2. Disposal precaution

No data available

14. Transport information

In accordance with UN RTDG / ADR / IMDG / IATA

UN RTDG	ADR	IMDG	IATA
14.1. UN number			
Not applicable	Not applicable	Not applicable	Not applicable

UN RTDG	ADR	IMDG	IATA
14.2. UN proper shipping name			
Not applicable	Not applicable	Not applicable	Not applicable
14.3. Transport hazard class(es)			
Not applicable	Not applicable	Not applicable	Not applicable
14.4. Packing group			
Not applicable	Not applicable	Not applicable	Not applicable
14.5. Marine pollutant			
Not applicable	Not applicable	Not applicable	Not applicable
No data available			

14.6. Special precautions for user

No data available

15. Regulatory information

15.1. Occupational Safety and Health Act

Hazardous Substances Prohibited for Manufacturing	Not applicable	
Hazardous Substances Requiring Permission	Not applicable	
Threshold Limit Values Chemicals	Applicable	7439-96-5: Manganese&Inorganic compounds, as Mn 7440-02-0: Nickel 7440-47-3: Chromium 7439-98-7: Molybdenum 7439-89-6: Iron salts (Soluble, as Fe) 7440-48-4: Cobalt and inorganic compounds 7429-90-5: Aluminum
Hazardous Substances Below Permissible Level	Applicable	7439-96-5: Manganese and its inorganic compounds 7440-02-0: Nickel and its insoluble inorganic compounds 7440-48-4: Cobalt and its inorganic compounds
Hazardous Substances Subject to Working Environment Measurement	Applicable	7439-96-5: Manganese and its inorganic compounds 7440-02-0: Nickel and its inorganic compounds 7440-47-3: Chromium and its inorganic compounds (contains above 1%) 7440-48-4: Cobalt and its inorganic compounds (contains above 1%) 7429-90-5: Aluminum and its compounds
Hazardous Substances Subject to Workers Requiring Health Examination	Applicable	7439-96-5: Manganese and its inorganic compounds 7440-02-0: Nickel and its inorganic compounds 7440-47-3: Chromium and its compounds (contains above 1%) 7440-48-4: Cobalt (contains above 1%) 7429-90-5: Aluminium and its compounds
Hazardous Substances Subject to Control	Applicable	7439-96-5: Manganese and its inorganic compounds 7440-02-0: Nickel and its inorganic compounds 7440-47-3: Chromium and its compounds(except Chromium(VI) compounds) (contains above 1%) 7439-89-6: Iron and its compounds 7440-48-4: Cobalt and its inorganic compounds (contains above 1%) 7429-90-5: Aluminum and its compounds

15.2. Chemicals Control Act

No data available

15.3. Safety Control of Dangerous Substances Act

Safety Control of Dangerous Substances Act	Applicable	KW-T617 (Class 2 Combustible solid - category 5 Metal powder (Designated quantity: 500kg); Class 2 Combustible solid - category 4 Iron Powder (Designated quantity: 500kg)) 7439-96-5: Manganese powder (Class 2 Combustible solid - category 5 Metal powder (Designated quantity: 500kg)) 7440-47-3: Chromium powder (Class 2 Combustible solid - category 5 Metal powder (Designated quantity: 500kg)) 7439-98-7: Molybdenum powder (Class 2 Combustible solid - category 5 Metal powder (Designated quantity: 500kg)) 7439-89-6: Iron powder (Class 2 Combustible solid - category 4 Iron Powder (Designated quantity: 500kg)) 7429-90-5: Aluminium Powder (Class 2 Combustible solid - category 5 Metal powder (Designated quantity: 500kg))

15.4. Wastes Control Act

Hazardous Substances in Designated wastes	Not applicable
Types of wastes	No data available

15.5. Other Domestic and International Regulatory Information

Other Domestic Regulations

Persistent Organic Pollutants(POPs) Control Act	Not applicable
Ozone Depleting Substances(ODS)	Not applicable

EU Regulatory Information

EU Candidate list (SVHC)	Contains no substance on the REACH candidate list
EU authorization list (REACH Annex XIV)	Contains no REACH Annex XIV substances
EU restriction list (REACH Annex XVII)	Applicable

US Regulatory Information

CERCLA Section 103 (40CFR302.4)	Contains listed substances
EPCRA Section 302 (40CFR355.30)	Not applicable
EPCRA Section 304 (40CFR355.40)	Not applicable
EPCRA Section 313 (40CFR372.65)	Contains listed substances

16. Other information

16.1. Data sources

REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006,Classification according to Classification, Labelling and Packaging of Substances and Mixtures (SEA) Regulation published in the Official Journal numbered 28848 on December 11, 2013,ECHA (European Chemicals Agency),Supplier's safety documents,No data available,This MSDS is prepared based on Article 41 of the Occupational Safety and Health Act and Notice No.2016-19 of the Ministry of Employment and Labor (based on the availability of material safety and health data), taking into account the status of regulations related to Korea,This MSDS is prepared based on KOSHA, NITE, ESIS, NLM, SIDS, IPCS, NCIS, etc,This safety data sheet was compiled with data and information from the following sources : RTECS, ECOSAR, HSDB, SIDS SIAP, ChemWATCH, CESAR, Chemical DB.

16.2. Issue date

6/28/1996

16.3. Revision number and date

Version	:	8.0
Revision date	:	1/16/2025

16.4. Other information

No data available

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.