PTVI Nickel Matte

(ACCORDING TO EC-REGULATION 1272/2008 (CLP))

Section 1. Identification of the Substance and Company

1.1 Product Identification:
Product Name: PTVI Nickel Matte

1.2 Uses
Identified Uses:
- PTVI Matte is used for production of nickel containing materials.

1.3 Company Identification

Distributed by:
Vale Limited
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Suite 1600, South Tower, PO Box 70
Toronto, ON
Canada, M5J 2K2
msds@vale.com

In Europe contact:
Vale Europe Limited
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SA6 5QR

msds@vale.com
REACH@vale.com

Telephone Number: +44 (0) 1792 842501
For Fire, Spill, or chemical emergency call CHEMTREC: +(44)-870-8200418

Section 2. Hazards Identification

2.1 Classification of the Substance:

2.1.1 Classification according Regulation (EC) No. 1272/2008

Skin Sensitization – Category 1;
Carcinogenicity – Category 1;
Specific Target Organ Toxicity, Repeated exposure – Category 1
Aquatic Toxicity – Acute 1
Aquatic Toxicity – Chronic 1

Hazard Pictograms:	GHS07 - Exclamation mark, GHS08 - Health Hazard, GHS09 – Environmental Hazard
Signal Word:	Danger
Hazard Statements:	H317 - May cause an allergic skin reaction. H350i - May cause cancer by inhalation H372 - Causes damage to lungs through prolonged or repeated inhalation exposure H410 - Very toxic to aquatic life with long lasting effects
Precautionary Statements:	P201, P202, P260, P261, P272, P280, P281, P264, P270, P273, P302+P352, P308+P313, P333+P313, P314, P321, P363, P391, P405, P501

2.1.2. Classification according to Directive 67/548/EEC
Carc. Cat. 1; R49; R43
T, R48/23
N, R50/43

2.2: Label elements
Labeling according to Regulation (EC) No 1272/2008

Product identifier: Nickel Matte
CAS #: 69012-50-6

Symbols: GHS07 - Exclamation mark, GHS08 - Health Hazard, GHS09 – Environmental Hazard

Signal Word: Danger

Hazard Statements: H350i, H372, H317, H410

Precautionary Statements: P202, P261, P281, P302+352, P501
(NOTE: P-statements has been reduced as per CLP regulation, the full list can be found in Section 15).

For full text of R-Statements and Precautionary, statements see section 15.

Section 3. Composition

☐ **Substance** ☒ **Mixture**

Hazardous Ingredients	Typical Composition (%)	C.A.S. Number
Nickel subsulfide	60-80	12035-72-7
Nickel cobalt iron alloy	balance	N/A
Cobalt (II) sulfide	<1	1317-42-6

Section 4. First Aid Measures

Ingestion: If swallowed do not induce vomiting. Seek medical attention
Inhalation: If inhaled, remove from contaminated area. Seek medical attention.
Skin: Wash thoroughly with water. For rashes seek medical advice. Show label if possible.
Eyes: Irrigate eyeball thoroughly with water for at least 10 minutes. If discomfort persists seek medical attention.
Wounds: Cleanse thoroughly to remove any particles.

Section 5. Fire Fighting Measures

Suitable extinguishing media: Any, type to be selected according to materials stored in the immediate area.

Special risks: Non-flammable. Keep containers cool with water spray.

Special protective

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

Section 6. Accidental Release Measures

Person related precautionary measures: Avoid generation of dusty atmospheres. Do not inhale dusts. Wear protective clothes, gloves, safety glasses, and respirator.

Environmental Protection measures: Contain spillage. Avoid entry in sewers, and water streams.

Procedures for cleaning/absorption: Pick up and replace in original container. Nickel-containing material is normally collected to recover nickel values.

Section 7. Handling and Storage

Handling: Prevent the generation of inhalable dusts e.g. by the use of suitable ventilation. Do not inhale dust. Wear appropriate nationally approved respirators if handling is likely to cause the concentration limits of airborne nickel to exceed the locally prescribed exposure limits. Wear suitable protective clothing and gloves.

Storage: Keep in the container supplied, and keep container closed when not in use. Store locked up. Local regulations should be followed regarding the storage of this product.

Section 8. Exposure Controls / Personal Protection

Nickel Subsulfide – CAS 12035-72-7	
	Exposure Limit
ACGIH TLV-TWA [1]	0.1 mg/m^3 * (as Ni)
UK WEL [2]	0.5 mg/m^3 (as Ni)
Japan	1 mg/m^3 (as Ni)
Korea	2 mg/m^3 (as Ni)
Indonesia	1 ppm

* - in inhalable fraction

Cobalt (II) sulfide – CAS 1317-42-6	
	Exposure Limit
ACGIH TLV-TWA [1]	0.02 mg/m^3 (as Co)
UK WEL [2]	0.1 mg/m^3 (as Co)
Japan	0.05 mg/m^3 (as Co)
Korea	0.05 mg/m^3 (as Co)

Maintain airborne levels as low as possible.

Occupational exposure controls:

a. Respiratory protection: Ventilation may be required if user operations change it to other physical or chemical forms, whether as end products, intermediates or fugitive emissions, which are inhalable.

b. Eye protection: None

c. Hand & Skin Protection: Avoid repeated skin contact. Wear suitable protective clothing and gloves, which should be selected specifically for the working place, depending on concentration and quantity of the hazardous material (overalls and leather/rubber gloves). Wash skin thoroughly after handling and before eating, drinking or smoking. Change contaminated clothing frequently. Launder clothing and gloves as needed. Use of skin-protective barrier cream advised.

Section 9. Physical and Chemical Properties

Black-grey colored granules; insoluble in water

pH	Not Applicable (N/A)
Boiling point/ boiling range	2582°C
Melting point	540°C
Flash Point	N/A
Evaporation rate	N/A
Vapor Temperature	2857°C
Flammability	N/A
Explosive properties	Not explosive
Vapor pressure	N/A
Vapor density	N/A
Relative density	No data
Solubility cold water	Insoluble
Solubility hot water	Insoluble
Partition coefficient	N/A
Auto-ignition temperature	N/A
Decomposition temperature	N/A
Oxidizing properties	Not oxidizing
Viscosity	N/A
Packaged Density	3.8 g/cm^3
Loose Density	3.3 g/cm^3
Particle size	70% 0.15 mm – 0.8 mm Max. 10% >0.8 mm Max. 20% <0.15mm

Section 10. Stability and Reactivity

Conditions to be avoided: No hazardous exothermic reaction.

Substances to be avoided: Like other metals, Nickel may react with acids to liberate hydrogen gas, which may form explosive mixtures in air.

Hazardous decomposition products: No information available.

Section 11. Toxicological Information

As a mixture the toxicological properties of this product are unknown. The toxicology of the reported ingredients is summarized below.

Nickel Subsulfide
LD50 oral rat > 5000 mg/kg

Inhalation:	The National Toxicology Program has listed nickel subsulfide as reasonably anticipated to be a carcinogen based on the production of injection-site tumors. The International Agency for Research on Cancer (IARC) concluded there was sufficient evidence that nickel compounds are carcinogenic to humans and that crystalline nickel sulfides are carcinogenic to animals. Epidemiological studies of workers engaged in the oxidation of nickel subsulfide (Ni_3S_2) by dusty processes indicated the presence of a significant respiratory cancer hazard. The American Conference of Governmental Industrial Hygienists (ACGIH) have classified nickel subsulfide as a Confirmed Human Carcinogen; category A1. Rats exposed by inhalation to ~1 mg Ni_3S_2/m^3 experienced an increased incidence of malignant lung tumors. Repeated intratracheal instillation of nickel subsulfide produced an increased incidence of malignant lung tumors in rats. Repeated intratracheal instillation of nickel subsulfide did not produce an increased incidence of malignant lung tumors in hamsters when administered at the maximum tolerated dose.
Wounds:	Nickel subsulfide is a potent experimental carcinogen in rodents by parenteral routes of administration.
Ingestion:	The U.S. National Institute for Occupational Safety and Health (NIOSH) concluded there is no evidence that nickel and its inorganic compounds are carcinogenic when ingested.

Nickel cobalt iron alloy
A literature search found no toxicological information for Nickel cobalt iron alloy. Toxicology information is provided for its main constituents; nickel, cobalt, and iron.

Nickel

Acute Toxicity:	
a) Oral:	Non toxic - LD50 ORAL RAT >9000 mg/kg
b) Inhalation:	No information available
c) Dermal:	No information available.
Corrosivity/Irritation:	
a) Respiratory Tract:	None
b) Skin:	See sensitization section.
c) Eyes:	Mechanical irritation may be expected.
Sensitization:	
a) Respiratory tract:	Nickel metal induced asthma is very rare. 3 case reports are available; the data is not sufficient to conclude that nickel metal is classified as a respiratory sensitizer.

b) Skin:	Nickel metal is a well-known skin sensitizer. Direct and prolonged skin contact with metallic nickel may induce nickel allergy and elicit nickel allergic skin reactions in those people already sensitized to nickel, so called nickel allergic contact dermatitis.
c) Pre-existing conditions:	Individuals known to be allergic to nickel should avoid contact with nickel whenever possible to reduce the likelihood of nickel allergic contact dermatitis reactions (skin rashes). Repeated contact may result in persistent chronic palmar/hand dermatitis in a smaller number of individuals, despite efforts to reduce or avoid nickel exposure.

Chronic toxicity:

a) Oral:	No information available
b) Inhalation:	Animal studies (rats) show that repeated dose inhalation of nickel damages the lung. Chronic inflammation, lung fibrosis and accumulation of nickel particles were observed.
c) Dermal:	Direct and prolonged skin contact with nickel metal may cause nickel sensitization resulting in nickel allergic contact dermatitis /skin rash.

Mutagenicity / Reproductive toxicity:	No data.

Carcinogenicity:

a) Ingestion:	The U.S. National Institute for Occupational Safety and Health (NIOSH) concluded that there is no evidence that nickel metal is carcinogenic when ingested.
b) Inhalation:	There is limited information available from inhalation and intratracheal studies in animals. The U.S. National Toxicology Program has listed metallic nickel as reasonably anticipated to be a human carcinogen. To date, there is no evidence that nickel metal causes cancer in humans based on epidemiology data from workers in the nickel producing and nickel consuming industries.

The International Agency for Research on Cancer (IARC)(Vol 49) found there was inadequate evidence that metallic nickel is carcinogenic to humans but since there was sufficient evidence that it is carcinogenic to animals, IARC concluded that metallic nickel is possibly carcinogenic to humans (Group 2B). In 1997, the ACGIH categorized elemental nickel as: A5 "Not Suspected as a Human Carcinogen". Epidemiological studies of workers exposed to nickel powder and to dust and fume generated in the production of nickel alloys and of stainless steel have not indicated the presence of a significant respiratory cancer hazard

Cobalt
LD50 oral rat: 6171 mg/kg

Inhalation:	Asthmatic symptoms and pulmonary fibrosis occurring in the tungsten carbide industry may be related to the inhalation of metallic cobalt dust. Evidence of polycythemia (an increase in the total red cell mass of the blood in the body) and altered thyroid, kidney and liver function have also been found. Excessive doses of metallic cobalt have produced cardiac changes in miniature swine.
Skin Contact:	Repeated contact with metallic cobalt can cause cobalt sensitivity and allergic skin rashes.
Wounds:	Cobalt powders have caused tumors at the site of injection in rodents. However, studies of cobalt containing prostheses do not suggest a significant risk for humans.
Pre-existing Conditions:	Sensitized individuals may experience an allergic skin rash or asthma.

Iron
LD50 oral rat: 30,000 mg/kg

Prolonged eye contact with the metal dust could cause rust-brown coloured spots forming around the particles and if left for several years, permanent damage could result.

Cobalt (II) Sulfide
Oral LD50 >5000 mg/kg

A literature search found no toxicological information for cobalt sulphide. Toxicology is expected to be similar to cobalt oxide.

Cobalt Oxide
Inhalation: Some workers engaged long-term in the production of cobalt oxides showed symptoms of chronic bronchitis. Inhalation experiments show that cobalt oxide accumulated in the lymph nodes of dogs suggesting it is tissue insoluble.

Section 12. Ecological Information

Very toxic to aquatic organisms may cause long-term adverse effects in the aquatic environment. Do not discharge into sewer or waterways.

Section 13. Disposal Considerations

Nickel-containing material is normally collected to recover nickel values. Should disposal be deemed necessary, follow local regulations.

Section 14. Transport Information

International Maritime Dangerous Goods Code	UN3077, Environmentally Hazardous Substance, Solid, NOS (Nickel subsulphide), class 9, PG III
International Civil Aviation Organization Technical Instructions for the Carriage of Dangerous Goods by Air	UN3077, Environmentally Hazardous Substance, Solid, NOS (Nickel subsulphide), class 9, PG III
U.S. Dept. of Transportation Regulations	Not regulated.
Canadian Transportation of Dangerous Goods Act	Not regulated.
European Agreement Concerning the International Carriage of Dangerous Goods by Road	UN3077, Environmentally Hazardous Substance, Solid, NOS (Nickel subsulphide), class 9, PG III (E)

Section 15. Regulatory Information

Europe:

Classification according to Dangerous Substance Directive 67/548/EEC
T- Toxic- Category 1 carcinogen
R48/23 - Toxic: danger of serious damage to health by prolonged exposure through inhalation.
R49 – May cause cancer by inhalation

R43 - May cause sensitization by skin contact.
N – R50/43 Dangerous for the environment; Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S53 – avoid exposure – obtain special instructions before use
S45 - In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).
S60 – this material and its container must be disposed of as hazardous waste
S61 – avoid release to the environment, refer to special instruction/safety data

All components are listed on EINECS. (European Inventory of Existing Chemical Substances)

Classification according to Part 3 of Annex VI of EU Regulation No. 1272/2008
Skin Sensitization – Category 1
Carcinogenicity – Category 1
Specific Target Organ Toxicity, Repeated exposure – Category 1
Aquatic Toxicity – Acute 1
Aquatic Toxicity – Chronic 1

Symbols: GHS07 - Exclamation mark, GHS08 - Health Hazard, GHS09 Environmental Hazard

Signal Word: Danger

Hazard Statements:
H317 - May cause an allergic skin reaction.
H372 - Causes damage to lungs through prolonged or repeated inhalation exposure
H350i - May cause cancer by inhalation
H410 - Very toxic to aquatic life with long lasting effects
H400 – Very toxic to aquatic life

Precautionary Statements:
Prevention:
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust or fume
P261 - Avoid breathing dust or fume
P272 - Contaminated work clothing should not be allowed out of the workplace.
P280 - Wear protective gloves and protective clothing
P281 - Use personal protective equipment as required
P264 - Wash hands, and face thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P273 - Avoid release to the environment

Response:
P302+P352 - If on skin: Wash with plenty of soap and water.
P308+P313 - If exposed or concerned: Get medical advise/attention
P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.
P314 - Get medical advice/attention if you feel unwell.
P321 - See Safety Data Sheet for specific treatment
P363 - Wash contaminated clothes before reuse

	P391 - Collect spillage
Storage:	P405 - store locked up
Disposal:	P501 - Dispose of contents/container in accordance to local; regional; national and international regulations

Section 16. Other Information

Indications of change:
1.0 - original document

The following acronyms may be found in this document:

ACGIH	American Conference of Governmental Industrial Hygienists
DNEL	Derived No Effect Level
LTEL	Long Term Exposure Limit
LR	Lead Registrant
MMAD	Mass Median Aerodynamic Diameter
NIOSH	National Institute of Occupational Safety and Health
OEL	Occupational Exposure Limits
OR	Only Representative
OSHA	Occupational Safety and Health Administration
PBT	PBT: Persistent, Bioaccumulative and Toxic
PNEC	Predicted No Effect Concentration
STEL	Short Term Exposure Limit
STOT	Specific Target Organ Toxicity
TLV-TWA	Threshold Limit Value – Time Weighted Average
vPvB	very Persistent and very Bioaccumulative
WEL	Workplace Exposure Limit (UK HSE EH40)

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Note:
Vale believes that the information in this Material Safety Data Sheet is accurate. However, Vale makes no express or implied warranty as to the accuracy of such information and expressly disclaims any liability resulting from reliance on such information.

1. Threshold Limit Values of the American Conference of Governmental Industrial Hygienists. 2008.
2. Maximum Exposure Limit of the Health and Safety Executive in the U.K. in EH40/00.