MATERIAL SAFETY DATA SHEET

according to the (US) Hazard Communication Standard (29 CFR 1910.1200)

Revision Date 08/22/2013 Version 1.1

SECTION 1. Identification

Product identifier

Product number	100824
Product name	Vanadium(V) oxide extra pure

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

Identified uses	Reagent for analysis, Chemical production

Details of the supplier of the safety data sheet

Company	EMD Millipore Corporation | 290 Concord Road, Billerica, MA 01821, United States of America | SDS Phone Support: +1-978-715-1335 | General Inquiries: +1-978-715-4321 | Monday to Friday, 9:00 AM to 4:00 PM Eastern Time (GMT-5)
Emergency telephone	800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2. Hazards identification

GHS Classification

Germ cell mutagenicity, Category 2, H341
Reproductive toxicity, Category 2, H361d
Acute toxicity, Category 4, Inhalation, H332
Acute toxicity, Category 4, Oral, H302
Specific target organ systemic toxicity - repeated exposure, Category 1, Respiratory Tract, H372
Specific target organ systemic toxicity - single exposure, Category 3, Respiratory system, H335
Chronic aquatic toxicity, Category 2, H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

GHS-Labeling

Hazard pictograms

Signal Word
Danger

Hazard Statements
H302 + H332 Harmful if swallowed or if inhaled.

H335 May cause respiratory irritation.
H341 Suspected of causing genetic defects.
H361d Suspected of damaging the unborn child.
H372 Causes damage to organs (Respiratory Tract) through prolonged or repeated exposure.
H411 Toxic to aquatic life with long lasting effects.

Precautionary Statements
P273 Avoid release to the environment.
P281 Use personal protective equipment as required.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

According to the criteria, the general hazard statement can be replaced by the hazard statement indicating only the property of concern, where either fertility or developmental effects are proven to be not relevant. See Annex VI, 1.2.3, General hazard statement not specifying the route of exposure as the necessary information is not available. See Annex VI, 1.2.2

OSHA Hazards
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Other hazards
None known.

SECTION 3. Composition/information on ingredients

Formula	V_2O_5	O_5V_2 (Hill)
CAS-No.	1314-62-1	
Molar mass	181.88 g/mol	

Hazardous ingredients
Chemical Name (Concentration)
CAS-No.
Divanadium pentaoxide (>= 90 % - <= 100 %)
1314-62-1

SECTION 4. First aid measures

Description of first-aid measures
Inhalation
After inhalation: fresh air. If breathing stops: mouth-to-mouth breathing or artificial respiration. Oxygen if necessary. Immediately call in physician.

Skin contact
After skin contact: wash off with plenty of water. Remove contaminated clothing. Consult a physician.

Eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist.

Ingestion
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed
Irritation and corrosion, irritant effects, Cough, Shortness of breath
Vanadium and its compounds generally cause irritations after eye and skin contact and mucosal irritations, coughing, and dyspnoea after inhalation. After absorption of toxic quantities changes in the blood picture, loss of weight, cardiovascular complaints.

Indication of any immediate medical attention and special treatment needed
No information available.

SECTION 5. Fire-fighting measures

Extinguishing media
Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

Special hazards arising from the substance or mixture
Not combustible.
Risk of dust explosion.

Advice for firefighters
Special protective equipment for fire-fighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid substance contact. Avoid inhalation of dusts.
Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.

Advice for emergency responders: Protective equipment see section 8.

Environmental precautions
Do not empty into drains.

Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills.
Observe possible material restrictions (see sections 7 and 10).
Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

SECTION 7. Handling and storage

Precautions for safe handling

Work under hood. Do not inhale substance/mixture.

Observe label precautions.

Conditions for safe storage, including any incompatibilities

Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage temperature: no restrictions.

SECTION 8. Exposure controls/personal protection

Exposure limit(s)

Ingredients

Basis	Value	Threshold limits	Remarks
Divanadium pentaoxide 1314-62-1			
ACGIH	Time Weighted Average (TWA):	0.05 mg/m³	Form of exposure: Inhalable fraction. Expressed as: as V
NIOSH/GUIDE	Ceiling Limit Value and Time Period (if specified):	0.05 mg/m³	Ceiling Limit Value 15-min Form of exposure: Fume. Expressed as: as V
	Ceiling Limit Value and Time Period (if specified):	0.05 mg/m³	Ceiling Limit Value 15-min Form of exposure: Dust. Expressed as: as V
OSHA_TRANS	Ceiling Limit Value:	0.1 mg/m³	Form of exposure: Fume. Expressed as: as V2O5
	Ceiling Limit Value:	0.5 mg/m³	Form of exposure: Respirable dust. Expressed as: as V2O5
Z1A	Time Weighted Average (TWA):	0.05 mg/m³	Form of exposure: Fume. Expressed as: as V2O5
	Time Weighted Average (TWA):	0.05 mg/m³	Form of exposure: Respirable dust. Expressed as: as V2O5

Engineering measures

Technical measures and appropriate working operations should be given priority over the use of personal protective equipment.

Individual protection measures

Protective clothing should be selected specifically for the workplace, depending on concentration and quantity of the hazardous substances handled. The chemical resistance of the protective equipment should be inquired at the respective supplier.

Hygiene measures

Immediately change contaminated clothing. Apply skin- protective barrier cream. Wash hands and face after working with substance. Work under hood. Do not inhale substance/mixture.

Eye/face protection
Safety glasses

Hand protection
Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Other protective equipment:
protective clothing

Respiratory protection
required when dusts are generated.
Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

SECTION 9. Physical and chemical properties

Physical state	solid
Color	yellow
Odor	odorless
Odor Threshold	No information available.
pH	ca. 4 at 50 g/l 68 °F (20 °C) (slurry)
Melting point	690 °C
Boiling point/boiling range	ca. 3,182 °F (1,750 °C) (decomposition)
Flash point	No information available.
Evaporation rate	No information available.
Flammability (solid, gas)	No information available.
Lower explosion limit	No information available.
Upper explosion limit	No information available.
Vapor pressure	No information available.
Relative vapor density	No information available.
Relative density	3.36 g/cm³ at 68 °F (20 °C)

Water solubility	at 68 °F (20 °C) slightly soluble
Partition coefficient: n-octanol/water	log Pow: 2.97 (calculated) (Lit.) Bioaccumulation is not expected (log Pow <1).
Autoignition temperature	No information available.
Decomposition temperature	No information available.
Viscosity, dynamic	No information available.
Explosive properties	No information available.
Bulk density	ca. 400 - 600 kg/m³

SECTION 10. Stability and reactivity

Reactivity

Oxidizing
catalytic
Risk of dust explosion.

Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

Possibility of hazardous reactions

Exothermic reaction with:

Alkali metals, halogen-halogen compounds

Risk of explosion with:

performic acid

Risk of ignition or formation of inflammable gases or vapors with:

Alkaline earth metals, sulfur, hydrochloric acid

Conditions to avoid

no information available

Incompatible materials

no information available

Hazardous decomposition products

no information available

SECTION 11. Toxicological information

Information on toxicological effects

Likely route of exposure
Eye contact, Skin contact, Ingestion

Target Organs
Eyes
Skin
Respiratory system

Acute oral toxicity
LD50 rat: 400 - 500 mg/kg (Lit.)

absorption

Acute inhalation toxicity
LC50 rat: 4.3 - 11.1 mg/l; 14 d (calculated) (Lit.)
Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract, Lung edema

absorption

Irritating to respiratory system.

Acute dermal toxicity
LD50 rat: > 2,000 mg/kg
(Lit.)

CMR effects
Mutagenicity:
Suspected of causing genetic defects.
Teratogenicity:
Suspected of damaging the unborn child.

Specific target organ systemic toxicity - single exposure
May cause respiratory irritation.

Specific target organ systemic toxicity - repeated exposure
Target Organs: Respiratory Tract
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
Regarding the available data the classification criteria are not fulfilled.

Carcinogenicity

IARC	Group 2B: Possibly carcinogenic to humans Divanadium pentaoxide 1314-62-1
OSHA	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
ACGIH	Confirmed animal carcinogen with unknown relevance to humans.

Divanadium pentaoxide	1314-62-1

Further information

Vanadium and its compounds generally cause irritations after eye and skin contact and mucosal irritations, coughing, and dyspnoea after inhalation. After absorption of toxic quantities changes in the blood picture, loss of weight, cardiovascular complaints.
Further data:
Handle in accordance with good industrial hygiene and safety practice.

SECTION 12. Ecological information

Ecotoxicity

No information available.

Persistence and degradability

No information available.

Bioaccumulative potential

Partition coefficient: n-octanol/water
log Pow: 2.97
(calculated)
(Lit.) Bioaccumulation is not expected (log Pow <1).

Mobility in soil

No information available.

Additional ecological information
We have no quantitative data concerning the ecological effects of this product.
Further information on ecology
Discharge into the environment must be avoided.

SECTION 13. Disposal considerations

The information presented only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. Disposal should be in accordance with applicable regional, national and local laws and regulations.

SECTION 14. Transport information

Land transport (DOT)

UN number	UN 2862
Proper shipping name	VANADIUM PENTOXIDE
Class	6.1
Packing group	III
Environmentally hazardous	--

Air transport (IATA)

UN number	UN 2862
Proper shipping name	VANADIUM PENTOXIDE
Class	6.1
Packing group	III
Environmentally hazardous	--
Special precautions for user	no

Sea transport (IMDG)

UN number	UN 2862
Proper shipping name	VANADIUM PENTOXIDE
Class	6.1
Packing group	III
Environmentally hazardous	--
Special precautions for user	yes
EmS	F-A S-A

SECTION 15. Regulatory information

United States of America

OSHA Hazards

Toxic by ingestion
Respiratory irritant
Teratogen
Mutagen
Target organ effects
Carcinogen

This information is based on 29 CFR 1910.1200 criteria prior to adoption of the GHS, and may deviate from the GHS information on the label and in section 2.

SARA 311/312 Hazards

Acute Health Hazard
Chronic Health Hazard

SARA 313

The following components are subject to reporting levels established by SARA Title III, Section 313:

Ingredients

Divanadium pentaoxide 1314-62-1

SARA 302

The following components are subject to reporting levels established by SARA Title III, Section 302:

Ingredients

Divanadium pentaoxide 1314-62-1

Clean Water Act

The following Hazardous Substances are listed under the U.S. CleanWater Act, Section 311, Table 116.4A:
Ingredients
Divanadium pentaoxide

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:
Ingredients
Divanadium pentaoxide

DEA List I
Not listed

DEA List II
Not listed

US State Regulations

Massachusetts Right To Know
Ingredients
Divanadium pentaoxide

Pennsylvania Right To Know
Ingredients
Divanadium pentaoxide

New Jersey Right To Know
Ingredients
Divanadium pentaoxide

California Prop 65 Components
This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

Notification status

TSCA:	All components of the product are listed in the TSCA-inventory.
DSL:	All components of this product are on the Canadian DSL.

SECTION 16. Other information

Training advice
Provide adequate information, instruction and training for operators.

Full text of H-Statements referred to under sections 2 and 3.

H302	Harmful if swallowed.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H341	Suspected of causing genetic defects.
H361d	Suspected of damaging the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H411	Toxic to aquatic life with long lasting effects.

Key or legend to abbreviations and acronyms used in the safety data sheet

Used abbreviations and acronyms can be looked up at www.wikipedia.org.

Revision Date08/22/2013