SAFETY DATA SHEET

Redox standard +250 mV

Section 1. Identification

Product identifier : Redox standard +250 mV

Other means of identification : Not available.

Product use : Laboratory chemicals.

Supplier's details : Manufacturer
Metrohm AG
Ionenstrasse
9100 Herisau
Schweiz
Tel.: +41 (0)71 353 85 85
Fax: +41 (0)71 353 89 01
E-Mail: info@metrohm.com
Web: www.metrohm.com

Supplier
Metrohm Canada
4160 Sladeview Crescent, #6
Mississauga, ON L5L 0A1
Canada

Tel.: +1 (905) 569-0664
E-Mail: info@metrohmca.com

e-mail address of person responsible for this SDS : datasheet@metrohm.com

Emergency telephone number (with hours of operation) : + 49 (0)6132-84463 (24 h, GBK GmbH)

Section 2. Hazard identification

Classification of the substance or mixture : Not classified.

GHS label elements

Signal word : No signal word.

Hazard statements : No known significant effects or critical hazards.

Precautionary statements

Prevention : Not applicable.

Response : Not applicable.

Storage : Not applicable.

Disposal : Not applicable.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

Ingredient name	% (w/w)	CAS number
Ferrate(4-), hexakis(cyano-C)-, tetrapotassium, trihydrate,(OC-6-11)-	≥1 - ≤5	14459-95-1
tripotassium hexacyanoferrate	≥1 - ≤5	13746-66-2
disodium hydrogenorthophosphate	≥1 - ≤5	7558-79-4
potassium dihydrogenorthophosphate	≥0.1 - ≤1	7778-77-0
sodium hydroxide	≤0.1	1310-73-2

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First-aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.

Ingestion : Wash out mouth with water. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.

Section 4. First-aid measures

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO2, water spray (fog) or foam. Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
phosphorus oxides
metal oxide/oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8).

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Ferrate(4-), hexakis(cyano-C)-, tetrapotassium, trihydrate,(OC-6-11)-	**CA Saskatchewan Provincial (Canada, 7/2013). [Cyanide salts as CN] Absorbed through skin.** CEIL: 5 mg/m³, (measured as CN) **CA British Columbia Provincial (Canada, 6/2022). [Cyanide salts as CN] Absorbed through skin.** C: 5 mg/m³, (as CN) **CA Ontario Provincial (Canada, 6/2019). [Cyanide salts as CN] Absorbed through skin.** Ceiling Limit: 5 mg/m³, (as CN) **CA Quebec Provincial (Canada, 6/2022). [Cyanides] Absorbed through skin.** STEV: 10 ppm, (as CN) 15 minutes. STEV: 11 mg/m³, (as CN) 15 minutes.
tripotassium hexacyanoferrate	**CA Saskatchewan Provincial (Canada, 7/2013). [Cyanide salts as CN] Absorbed through skin.** CEIL: 5 mg/m³, (measured as CN) **CA Saskatchewan Provincial (Canada, 7/2013). [Iron salts, soluble as Fe]** STEL: 3 mg/m³, (measured as Fe) 15 minutes. TWA: 1 mg/m³, (measured as Fe) 8 hours. **CA British Columbia Provincial (Canada, 6/2022). [Cyanide salts as CN] Absorbed through skin.** C: 5 mg/m³, (as CN) **CA British Columbia Provincial (Canada, 6/2022). [Iron salts - soluble as Fe]** TWA: 1 mg/m³, (as Fe) 8 hours. STEL: 2 mg/m³, (as Fe) 15 minutes. **CA Ontario Provincial (Canada, 6/2019). [Iron salts, soluble as Fe]** TWA: 1 mg/m³, (as Fe) 8 hours. **CA Ontario Provincial (Canada, 6/2019).**

Section 8. Exposure controls/personal protection

	[Cyanide salts as CN] Absorbed through skin. Ceiling Limit: 5 mg/m³, (as CN) **CA Quebec Provincial (Canada, 6/2022). [Cyanides] Absorbed through skin.** STEV: 10 ppm, (as CN) 15 minutes. STEV: 11 mg/m³, (as CN) 15 minutes. **CA Quebec Provincial (Canada, 6/2022). [Iron salts, soluble]** TWAEV: 1 mg/m³, (as Fe) 8 hours. **CA Alberta Provincial (Canada, 6/2018). [Iron salts, soluble as Fe]** OEL: 1 mg/m³, (as Fe) 8 hours.
sodium hydroxide	**CA Saskatchewan Provincial (Canada, 7/2013).** CEIL: 2 mg/m³ **CA British Columbia Provincial (Canada, 6/2022).** C: 2 mg/m³ **CA Ontario Provincial (Canada, 6/2019).** Ceiling Limit: 2 mg/m³ **CA Quebec Provincial (Canada, 6/2022).** STEV: 2 mg/m³ 15 minutes. **CA Alberta Provincial (Canada, 6/2018).** C: 2 mg/m³

Biological exposure indices

No exposure indices known.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

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. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Section 8. Exposure controls/personal protection

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.
Recommended: In accordance with CSA Z94.4-11.

Section 9. Physical and chemical properties

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

Appearance

Physical state : Liquid.

Color : Yellow.

Odor : Odorless.

Odor threshold : Not applicable.

pH : 7

Melting point/freezing point : Not available.

Boiling point, initial boiling point, and boiling range : Not available.

Flash point : Not available.

Evaporation rate : Not available.

Flammability : Not available.

Lower and upper explosion limit/flammability limit : Not available.

Vapor pressure : Not available.

Relative vapor density : Not available.

Relative density : Not available.

Density : 1.06473 g/cm³ [20°C (68°F)]

Solubility in water : Not available.

Partition coefficient: n-octanol/water : Not applicable.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not available.

Particle characteristics

Median particle size : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Keep away from heat, sparks and flame.

Section 10. Stability and reactivity

Incompatible materials : No specific data.

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

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Ferrate(4-), hexakis(cyano-C)-, tetrapotassium, trihydrate,(OC-6-11)-	LD50 Oral	Rat	3613 mg/kg	-
tripotassium hexacyanoferrate	LD50 Dermal	Rat - Male, Female	>2000 mg/kg	-
	LD50 Oral	Rat	>5110 mg/kg	-
disodium hydrogenorthophosphate	LC50 Inhalation Dusts and mists	Rat - Male, Female	>0.83 mg/l	4 hours
	LD50 Dermal	Rat - Male, Female	>2000 mg/kg	-
	LD50 Oral	Rat - Female	>2000 mg/kg	-
potassium dihydrogenorthophosphate	LC50 Inhalation Vapor	Rat - Male, Female	>0.83 mg/l	4 hours
	LD50 Dermal	Rabbit - Male, Female	>2000 mg/kg	-
	LD50 Oral	Rat - Female	>2000 mg/kg	-

Conclusion/Summary : Based on available data, the classification criteria are not met.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Ferrate(4-), hexakis(cyano-C)-, tetrapotassium, trihydrate,(OC-6-11)-	Eyes - Mild irritant	Rabbit	-	-	-
	Skin - Not irritant	Rabbit	-	-	-
tripotassium hexacyanoferrate	Eyes - Irritant	Rabbit	-	-	-
	Skin - Not irritant	Human	-	-	-
disodium hydrogenorthophosphate	Eyes - Not irritant	Rabbit	-	0.5 minutes	-
	Skin - Not irritant	Rabbit	-	24 hours	-
potassium dihydrogenorthophosphate	Eyes - Not irritant	Rabbit	-	0.5 minutes	-
	Skin - Not irritant	Rabbit	-	4 hours	-

Conclusion/Summary

Skin : Based on available data, the classification criteria are not met.

Eyes : Based on available data, the classification criteria are not met.

Section 11. Toxicological information

Respiratory : Not available.

Sensitization

Product/ingredient name	Route of exposure	Species	Result
Ferrate(4-), hexakis(cyano-C)-, tetrapotassium, trihydrate,(OC-6-11)-	Respiratory	Guinea pig	Not sensitizing
	skin	Guinea pig	Not sensitizing
tripotassium hexacyanoferrate	skin	Mouse	Not sensitizing
disodium hydrogenorthophosphate	skin	Mouse	Not sensitizing

Conclusion/Summary

Skin : Based on available data, the classification criteria are not met.

Respiratory : Based on available data, the classification criteria are not met.

Mutagenicity

Product/ingredient name	Test	Experiment	Result
tripotassium hexacyanoferrate	OECD 471	Subject: Bacteria Metabolic activation: with and without	Negative
disodium hydrogenorthophosphate	OECD 473	Experiment: In vitro Subject: Mammalian-Human Metabolic activation: with and without	Negative
	-	Experiment: In vitro Subject: Mouse Metabolic activation: with and without	Negative
	OECD 487	Subject: Mammalian-Human Metabolic activation: with and without	Negative
potassium dihydrogenorthophosphate	-	Experiment: In vitro Subject: Mammalian-Animal Metabolic activation: with and without	Negative
	OECD 487	Experiment: In vitro Subject: Mammalian-Human Metabolic activation: with and without	Negative

Conclusion/Summary : Based on available data, the classification criteria are not met.

Carcinogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Section 11. Toxicological information

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

Conclusion/Summary : Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Reproductive toxicity : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Product/ingredient name	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (gases) (ppm)	Inhalation (vapors) (mg/l)	Inhalation (dusts and mists) (mg/l)
Ferrate(4-), hexakis(cyano-C)-, tetrapotassium, trihydrate,(OC-6-11)-	3613	N/A	N/A	N/A	N/A

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Ferrate(4-), hexakis(cyano-C)-, tetrapotassium, trihydrate,(OC-6-11)-	Acute EC50 32 mg/l	Daphnia	48 hours
tripotassium hexacyanoferrate	Acute EC50 >1000 mg/l Static	Activated sludge	-
	Acute EC50 3.1 mg/l Static	Algae - *Raphidocelis subcapitata*	72 hours
	Acute EC50 59 mg/l Static	Daphnia - *Daphnia magna*	48 hours
	Acute LC50 >100 mg/l Static	Fish - *Cyprinus carpio*	96 hours
disodium hydrogenorthophosphate	Acute EC50 >1000 mg/l Static	Activated sludge	3 hours
	Acute EC50 >100 mg/l Static	Algae - *Desmodesmus subspicatus*	72 hours
	Acute EC50 >100 mg/l Static	Daphnia - *Daphnia magna*	48 hours
	Acute LC50 >100 mg/l	Fish - *Oncorhynchus mykiss*	96 hours
potassium dihydrogenorthophosphate	Acute EC50 >1000 mg/l Static	Activated sludge	3 hours
	Acute EC50 >100 mg/l Static	Algae - *Desmodesmus subspicatus*	72 hours
	Acute EC50 >100 mg/l Static	Daphnia - *Daphnia magna*	48 hours
	Acute LC50 >100 mg/l	Fish - *Oncorhynchus mykiss*	96 hours
sodium hydroxide	Acute EC50 40.4 mg/l	Crustaceans - *Ceriodaphnia*	48 hours

Conclusion/Summary : Based on available data, the classification criteria are not met.

Persistence and degradability

Conclusion/Summary : There are no data available on the mixture itself.

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Ferrate(4-), hexakis(cyano-C)-, tetrapotassium, trihydrate,(OC-6-11)-	-	-	Not readily

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Mobility : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	TDG Classification	DOT Classification	ADR/RID	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-	-	-
Transport hazard class(es)	-	-	-	-	-
Label					
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	Marine Pollutant: No	No.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not applicable.

Section 15. Regulatory information

Canadian lists

Canadian NPRI : The following components are listed: Cyanides (ionic); Cyanides (ionic); phosphorus (total)

CEPA Toxic substances : None of the components are listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Section 15. Regulatory information

Not listed.

Inventory list

Australia	:	All components are listed or exempted.
Canada	:	All components are listed or exempted.
China	:	All components are listed or exempted.
Eurasian Economic Union	:	**Russian Federation inventory**: All components are listed or exempted.
Japan	:	**Japan inventory (CSCL):** All components are listed or exempted.
New Zealand	:	All components are listed or exempted.
Philippines	:	All components are listed or exempted.
Republic of Korea	:	All components are listed or exempted.
Taiwan	:	All components are listed or exempted.
Thailand	:	All components are listed or exempted.
United States	:	All components are active or exempted.
Viet Nam	:	All components are listed or exempted.

Section 16. Other information

History

Date of printing	:	2023-09-26
Date of issue/Date of revision	:	2023-09-25
Date of previous issue	:	No previous validation
Version	:	1
Key to abbreviations	:	ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor DOT = Department of Transportation GHS = Globally Harmonized System of Classification and Labelling of Chemicals HPR = Hazardous Products Regulations IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) N/A = Not available RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail SGG = Segregation Group TDG = Transportation of Dangerous Goods UN = United Nations

Procedure used to derive the classification

Classification	Justification
Not classified.	

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.