MATERIAL SAFETY DATA SHEET

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Section 1 - Product and Company Information

Product Name	POTASSIUM DICHROMATE SIGMAULTRA
Product Number	P2588
Brand	SIAL
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
POTASSIUM DICHROMATE	7778-50-9	Yes

Formula	K2Cr2O7
Synonyms	Bichromate of potash * Dipotassium dichromate * Iopezite * Kaliumdichromat (German) * Potassium bichromate * Potassium dichromate * Potassium dichromate(VI)
RTECS Number:	HX7680000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Oxidizing. Highly Toxic (USA) Very Toxic (EU). Dangerous for the environment.
May cause cancer. May cause heritable genetic damage. May impair fertility. May cause harm to the unborn child. Contact with combustible material may cause fire. Also very toxic by inhalation, in contact with skin and if swallowed. Causes burns. May cause sensitization by inhalation and skin contact. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Target organ(s): Lungs. Kidneys.

HMIS RATING

HEALTH: 4*
FLAMMABILITY: 1
REACTIVITY: 3
SPECIAL HAZARD(S): Oxidizer

NFPA RATING

HEALTH: 4
FLAMMABILITY: 1
REACTIVITY: 3
SPECIAL HAZARD(S): Oxidizer

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment. This may include self-contained breathing apparatus to protect against the hazardous effects of the normal products of combustion or oxygen deficiency
Specific Hazard(s): Contact with other material may cause fire. Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed. Keep away from combustible materials, heat, sparks, and open flame. Store in a cool dry place.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use only in a chemical fume hood.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	0.05 MG(CR)/M3
USA	MSHA Standard-air	TWA	0.5 MG(CR)/M3
USA	OSHA.	PEL	CL 0.1 MG(CRO3)/M3
USA	NIOSH	TWA	0.001 MG(CR)/M3

Section 9 - Physical/Chemical Properties

Appearance — Physical State: Solid
Form: Fine crystals

Property	Value	At Temperature or Pressure
Molecular Weight	294.19 AMU	
pH	3.5 - 5.0	
BP/BP Range	N/A	
MP/MP Range	390 ˚C	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	2.68 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	

Decomposition Temp.	N/A
Flash Point	N/A
Explosion Limits	N/A
Flammability	N/A
Autoignition Temp	N/A
Refractive Index	N/A
Optical Rotation	N/A
Miscellaneous Data	N/A
Solubility	Solubility in Water:0.1 M in H2O, 20˚C Complete, orange

N/A = not available

Section 10 - Stability and Reactivity

STABILITY

Materials to Avoid: Organic materials Avoid contact with acid., Finely powdered metals, Hydrazine

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Potassium oxides, Chromium (VI) oxide.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE

Skin Contact: Causes burns.
Skin Absorption: May be fatal if absorbed through skin.
Eye Contact: Causes burns.
Inhalation: Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. May be fatal if inhaled.
Ingestion: May be fatal if swallowed.

SENSITIZATION

Respiratory: May cause allergic respiratory reaction.
Skin: May cause allergic skin reaction.

TARGET ORGAN(S) OR SYSTEM(S)

Blood. Kidneys. Lungs.

SIGNS AND SYMPTOMS OF EXPOSURE

Inhalation of dichromate dusts can cause ulceration and perforation of the nasal septum. Contact with breaks in the skin can cause ulceration (chrome sores). Other symptoms of exposure include erosion and discoloration of the teeth, nephritis, epigastric pain (inflammation and ulceration of the gastrointestinal tract). Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may result in spasm, inflammation and edema of the larynxand bronchi, chemical pneumonitis, and pulmonary edema. Coma. Cyanosis. Vomiting. Ingestion can cause: Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

TOXICITY DATA

Oral

Child
26 mg/kg
LDLO
Remarks: Gastrointestinal:Nausea or vomiting. Lungs, Thorax, or Respiration:Respiratory stimulation. Behavioral:Somnolence (general depressed activity).

Oral
Man
143 mg/kg
LDLO
Remarks: Lungs, Thorax, or Respiration:Dyspnea. Vascular:BP lowering not charactertized in autonomic section. Kidney, Ureter, Bladder:Urine volume decreased.

Oral
Child
50 mg/kg
LDLO

Oral
Rat
25 mg/kg
LD50
Remarks: Behavioral:Somnolence (general depressed activity). Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other. Behavioral:Ataxia.

Intraperitoneal
Rat
28 MG/KG
LD50

Oral
Mouse
190 mg/kg
LD50

Intraperitoneal
Mouse
37 MG/KG
LD50

Skin
Rabbit
14 mg/kg
LD50
Remarks: Gastrointestinal:Hypermotility, diarrhea. Lungs, Thorax, or Respiration:Acute pulmonary edema. Skin and Appendages:Skin: After systemic exposure: Dermatitis, other

CHRONIC EXPOSURE - CARCINOGEN
Result: This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

IARC CARCINOGEN LIST

Rating: Group 1

ACGIH CARCINOGEN LIST

Rating: A1

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 1 GM/KG
Route of Application: Oral
Exposure Time: (0-19D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse
Dose: 2546 MG/KG
Route of Application: Oral
Exposure Time: (14-19D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Species: Mouse
Dose: 20 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D MALE)
Result: Effects on Embryo or Fetus: Fetal death.

CHRONIC EXPOSURE - MUTAGEN
Result: May alter genetic material.

Species: Human
Dose: 300 UG/L
Cell Type: lymphocyte
Mutation test: Micronucleus test

Species: Human
Dose: 200 NMOL/L
Cell Type: fibroblast
Mutation test: Morphological transformation.

Species: Human
Dose: 500 NMOL/L
Cell Type: fibroblast
Mutation test: DNA damage

Species: Human
Dose: 10 UMOL/L
Cell Type: lung
Mutation test: DNA damage

Species: Human
Dose: 1 UMOL/L
Cell Type: liver
Mutation test: DNA damage

Species: Human
Dose: 50 UMOL/L
Cell Type: fibroblast
Mutation test: Unscheduled DNA synthesis

Species: Human
Dose: 100 UMOL/L
Cell Type: fibroblast
Mutation test: DNA inhibition

Species: Human
Dose: 13 UMOL/L
Cell Type: HeLa cell
Mutation test: DNA inhibition

Species: Human
Dose: 100 UMOL/L
Cell Type: fibroblast
Mutation test: Other mutation test systems

Species: Human
Dose: 150 UG/L
Cell Type: fibroblast
Mutation test: Other mutation test systems

Species: Human
Dose: 3 MG/L
Cell Type: lymphocyte
Mutation test: Other mutation test systems

Species: Human
Dose: 500 MG/L
Cell Type: Other cell types
Mutation test: Other mutation test systems

Species: Human
Dose: 100 UMOL/L
Exposure Time: 1H
Cell Type: Other cell types
Mutation test: Other mutation test systems

Species: Human
Dose: 500 NMOL/L
Cell Type: leukocyte
Mutation test: Cytogenetic analysis

Species: Human
Dose: 300 UG/L
Cell Type: lymphocyte
Mutation test: Cytogenetic analysis

Species: Human
Dose: 500 MG/L
Cell Type: Other cell types
Mutation test: Cytogenetic analysis

Species: Human
Dose: 150 UG/L
Cell Type: fibroblast
Mutation test: Cytogenetic analysis

Species: Human
Dose: 300 UG/L
Cell Type: lymphocyte
Mutation test: Sister chromatid exchange

Species: Human
Dose: 100 NMOL/L
Cell Type: fibroblast
Mutation test: Sister chromatid exchange

Species: Rat
Route: Intraperitoneal
Dose: 5 MG/KG
Mutation test: Cytogenetic analysis

Species: Rat
Dose: 1200 NMOL/L
Cell Type: lymphocyte
Mutation test: Cytogenetic analysis

Species: Rat
Route: Intravenous
Dose: 12 MG/KG
Mutation test: Cytogenetic analysis

Species: Rat
Route: Oral
Dose: 365 MG/KG
Exposure Time: 1Y
Mutation test: Cytogenetic analysis

Species: Mouse
Route: Intraperitoneal
Dose: 50 MG/KG
Mutation test: Micronucleus test

Species: Mouse
Dose: 200 UMOL/L
Cell Type: leukocyte
Mutation test: DNA damage

Species: Mouse
Route: Intraperitoneal
Dose: 20 GM/KG
Mutation test: DNA inhibition

Species: Mouse
Route: Oral
Dose: 20 MG/KG
Mutation test: Cytogenetic analysis

Species: Mouse
Dose: 1 UMOL/L
Exposure Time: 48H
Cell Type: mammary gland
Mutation test: Cytogenetic analysis

Species: Mouse
Dose: 1 UMOL/L
Cell Type: lymphocyte
Mutation test: Sister chromatid exchange

Species: Mouse
Dose: 1 UMOL/L
Cell Type: Embryo
Mutation test: Sister chromatid exchange

Species: Mouse
Dose: 1 UMOL/L
Cell Type: Other cell types
Mutation test: Sister chromatid exchange

Species: Mouse
Route: Intraperitoneal
Dose: 20 MG/KG
Mutation test: Dominant lethal test

Species: Mouse
Route: Unreported
Dose: 20 MG/KG
Mutation test: Dominant lethal test

Species: Mouse
Dose: 1 MG/L
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Mouse
Route: Intraperitoneal
Dose: 4 MG/KG
Mutation test: sperm

Species: Hamster
Route: Intraperitoneal
Dose: 20 MG/KG
Mutation test: Micronucleus test

Species: Hamster
Dose: 200 UG/L
Cell Type: Embryo
Mutation test: Morphological transformation.

Species: Hamster
Dose: 25 UG/L
Cell Type: kidney
Mutation test: Morphological transformation.

Species: Hamster
Dose: 10 MG/L
Cell Type: kidney
Mutation test: DNA damage

Species: Hamster
Dose: 10 MMOL/L
Cell Type: ovary
Mutation test: DNA damage

Species: Hamster
Dose: 10 UMOL/L
Cell Type: lung
Mutation test: DNA damage

Species: Hamster
Dose: 300 UMOL/L
Cell Type: lung
Mutation test: DNA inhibition

Species: Hamster
Dose: 1 MG/L
Cell Type: kidney
Mutation test: DNA inhibition

Species: Hamster
Dose: 100 UMOL/L

Cell Type: fibroblast
Mutation test: DNA inhibition

Species: Hamster
Dose: 10 MG/L
Cell Type: kidney
Mutation test: Other mutation test systems

Species: Hamster
Route: Intraperitoneal
Dose: 8 MG/KG
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 500 UG/L
Cell Type: lung
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 100 UG/L
Exposure Time: 24H
Cell Type: Embryo
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 250 UG/L
Cell Type: ovary
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 10 NMOL/L
Cell Type: ovary
Mutation test: Sister chromatid exchange

Species: Hamster
Dose: 800 UG/L
Cell Type: fibroblast
Mutation test: Sister chromatid exchange

Species: Hamster
Dose: 16 MG/L
Cell Type: lung
Mutation test: Sister chromatid exchange

Species: Hamster
Route: Intraperitoneal
Dose: 10 MG/KG
Mutation test: Sister chromatid exchange

Species: Hamster
Dose: 20 UMOL/L
Cell Type: kidney
Mutation test: Sister chromatid exchange

Species: Hamster
Dose: 100 UG/L
Cell Type: lung
Mutation test: Mutation in mammalian somatic cells.

Species: Hamster
Dose: 7 UMOL/L
Cell Type: ovary

Mutation test: Mutation in mammalian somatic cells.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 525 MG/KG
Route of Application: Oral
Exposure Time: (21D PREG)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rat
Dose: 500 MG/KG
Route of Application: Oral
Exposure Time: (0-19D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord).

Species: Rat
Dose: 1771 MG/KG
Route of Application: Oral
Exposure Time: (90D PRE)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat
Dose: 980 UG/KG
Route of Application: Intraperitoneal
Exposure Time: (7W MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count). Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Mouse
Dose: 1710 MG/KG
Route of Application: Oral
Exposure Time: (19D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Craniofacial (including nose and tongue).

Species: Mouse
Dose: 1 GM/KG
Route of Application: Oral
Exposure Time: (20D PRE)
Result: Effects on Fertility: Post-implantation mortality (e.g.,

dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse
Dose: 1697 MG/KG
Route of Application: Oral
Exposure Time: (14-19D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Maternal Effects: Other effects. Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord).

Species: Mouse
Dose: 700 MG/KG
Route of Application: Unreported
Exposure Time: (35W MALE)
Result: Effects on Fertility: Other measures of fertility

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Time: 96 h
Value: 25.0 - 150.0 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 48 h
Value: 0.035 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Toxic solids, oxidizing, n.o.s.
UN#: 3086
Class: 6.1
Packing Group: Packing Group I
Hazard Label: Oxidizer
PIH: Not PIH

IATA
Proper Shipping Name: Toxic solid, oxidizing, n.o.s.
IATA UN Number: 3086
Hazard Class: 6.1
Packing Group: I
Not Allowed - Aircraft: Cargo aircraft only. Not permitted on passenger aircraft.

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION

Symbol of Danger: O-T+-N

Indication of Danger: Oxidizing. Very toxic. Dangerous for the environment.

R: 45-46-60-61-8-21-25-26-34-42/43-48/23-50/53

Risk Statements: May cause cancer. May cause heritable genetic damage. May impair fertility. May cause harm to the unborn child. Contact with combustible material may cause fire. Also harmful in contact with skin. Also toxic if swallowed. Also very toxic by inhalation. Causes burns. May cause sensitization by inhalation and skin contact. Also toxic: danger of serious damage to health by prolonged exposure through inhalation. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S: 53-45-60-61

Safety Statements: Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Oxidizing. Highly Toxic (USA) Very Toxic (EU). Dangerous for the environment.

Risk Statements: May cause cancer. May cause heritable genetic damage. May impair fertility. May cause harm to the unborn child. Contact with combustible material may cause fire. Also very toxic by inhalation, in contact with skin and if swallowed. Causes burns. May cause sensitization by inhalation and skin contact. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. After contact with skin, wash immediately with plenty of soap-suds. Wear suitable protective clothing and gloves. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US Statements: Target organ(s): Lungs. Kidneys.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes

DEMINIMIS: 0.1 %

NOTES: This product is subject to SARA section 313 reporting requirements - chromium compounds.

TSCA INVENTORY ITEM: Yes

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65

California Prop - 65: This product is or contains chemical(s) known to the state of California to cause cancer.

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.