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MATERIAL SAFETY DATA SHEET

Section 1 - Product and Company Identification

Product Name: **CRS Indicating Oxygen-Removing Purifier** Document No. **991033**

CRS Part Numbers: **202220, 202223, 202224, 202225, 202806, 202816, 202820, 202872**

Date Revised: **03/30/05; 01/18/02** Date of Original: **08/18/97** Number of Pages: **5**

Manufacturer's Name: **CHROMATOGRAPHY RESEARCH SUPPLIES, INC.**
2601 Technology Drive Louisville, KY 40299

For chemical emergency call:
CHEMTREC (24 Hours) 800-424-9300 (U.S.A)
When Calling from Outside the U.S.A. Dial Your Access Code for the U.S.A., then 1, then 703-527-3887

Section 2 - Composition/Information on Ingredients

A sealed chromatograph filter cartridge containing the following mixture: Activated copper oxide [1317-38-0] <18%; Magnesium oxide [1309-48-4] <10%; Silicic acid [1343-98-2] <15%; Barium oxide [1304-28-5] <1%; Chromium oxide [1308-38-9] <1%; Zinc oxide [1314-13-2] <1%; Sodium oxide [1313-59-3] <10%; **Manganese dioxide [1313-13-9] 40-60%; and Graphite [7782-42-5] <10.**
Chemical Families: Reduced metallic oxides in colloidal mineral carbon
Chemical Synonyms: **Activated copper oxide** is also known as *copper(II)oxide, copper monoxide, copper monooxide, copper(2)oxide, and cupric oxide.* **Magnesium oxide** is also known as *magnesia.* **Zinc oxide** is also known as *zinc white.* **Barium oxide** is also known as barium monoxide and *barium protoxide.* **Chromium oxide** is also known as chromium (III) oxide; chromium sesquioxide; chrome green; chrome oxide; chromic acid green; and chromium oxide green. **Silicic acid** is also known as *silica gel.* **Sodium oxide** is also known *as disodium monoxide; disodium oxide; and sodium monoxide.* **Manganese dioxide** is also known as manganese binoxide; manganese peroxide; manganese superoxide and black manganese oxide. **Graphite** is also known as *mineral carbon, natural graphite, black lead, and plumbago.*

Section 3 - Hazards Identification

Do not open cartridge. Contents may generate heat in contact with air or water.

Emergency Overview
Appearance (contents of cartridge): Black or gray powder; green powder becomes gray on exposure to air.
Immediate concerns: May cause burns. Irritant - Dust may irritate mucous membranes, eyes, lungs and skin. Harmful if swallowed or inhaled. Inhaling dust can cause irritation of the upper repiratory tract, and my lead to "metal fume fever", a flu-like condition. Long term exposure by inhaling or swallowing can affect the central nervous system or lungs. Sodium oxide reacts violently with water or moisture. Reducer in the active state; when depleted by reaction with oxygen becomes an oxidizer.

Routes of Entry: Inhalation (breathing), ingestion (swallowing), eyes, skin.

Potential Health Effects
Eyes: Product is abrasive to the eyes and may cause irritation.
Skin: Product is abrasive to skin and may cause irritation. Prolonged skin exposure to trivalent chromium compounds may cause dermatitius. May cause sensitization by skin contact.
Ingestion: May result in G.I. disturbances and possible hemorrhage. Renal failure may occur after a few days. Methemoglobinemia has also been reported. Long term exposure by swallowing can affect the central nervous system.
Inhalation: Dust can cause irritation of the upper respiratory tract and may lead to "metal fume fever", a flu-like condition. Inhalation of magnesium oxide fumes have been known to produce leukocytosis. Chronic exposure to manganese dioxide by breathing low levels of dust or fume for a long time can result in disease of the central nervous system similar to Parkinsonism.

Signs and Symptoms of Overexposure
Eyes: Irritation from mechanical abrasion.
Skin: Irritation from mechanical abrasion.
Ingestion: May produce metallic taste, severe nausea, vomiting, abdominal pain, diarrhea and hemolysis.
Inhalation: Flu-like symptoms may include fever, chills, nausea and vomiting, muscular aches, weakness and fatigue. Breathing high concentration of dust or fume may produce metallic taste, dryness and irritation of the throat, coughing, sneezing, and bronchitis.

Medical Conditions Aggravated:
Eye, skin, and respiratory diseases or disorders would be aggravated by repeated or prolonged exposure to the dust or fume from this chemical. Iron deficiency may increase susceptibility to manganese poisoning.

Section 4 - First-Aid Measures

Inhalation: If inhaled, remove to fresh air. If breathing is difficult give oxygen. Get immediate medical attention. **Eye Contact:** Immediately rinse eyes with water. Remove any contact lenses, and continue flushing eyes with running water for at least 15 minutes. Hold eyelids apart to ensure rinsing of the entire surface of the eyes and lids with water. Get immediate medical attention. **Skin Contact:** Wash affected areas with plenty of water, and soap if available, for several minutes. Remove and clean contaminated clothing and shoes before reuse. See medical attention if irritation develops or persists. **Ingestion:** Give 3 – 4 glasses of water, but DO NOT INDUCE vomiting. Never give fluids or induce vomiting if the victim is unconscious or having convulsions. If vomiting occurs, give fluids again. Get medical attention to determine whether vomiting or evacuation of stomach is necessary.

Section 5 - Fire-Fighting Measures

Extinguishing Media: : The unopened cartridge is non-flammable; however, the contents which themselves are non-flammable, on exposure to air or moisture may generate enough heat to cause combustibles to burn. Use extinguishing media appropriate to the surroundings.**Special Fire Fighting Procedures**: Wear full protective clothing and self contained positive pressure breathing apparatus certified by NIOSH when fighting chemically related fires. Metal fines should not be exposed to air or moisture since they may react to form metallic oxides and produce sufficient heat (heat of formation) to ignite combustible materials such as paper and cardboard. **Unusual Fire and Explosion Hazards**: When exposed to air or moisture, the contents of these cartridges may get quite hot, flooding will reduce temperature to a safe limit.

Section 6 - Accidental Release Measures

Spill Control: Do not open cartridges. If accidentally opened, the contents should immediately be collected in a non-combustible container such as glass; move containers from spill area. Minimize airborne particulates. Protect against inhalation of dusts. Dispose of as a RCRA “ignitable” material – D001. Personal protective equipment should be worn during remediation of accidental releases according to the nature and quantity of the material involved. See Section 8 for a description of recommended personal protective equipment.

Section 7 - Handling and Storage

Handling: Do not open cartridge. For contents: Do not breathe dust and avoid contact with eyes, skin and clothing. Minimize dust generation and accumulation. Wash thoroughly after handling. **Storage:** Store in a cool dry place. Proper storage must be determined based on other materials stored and their hazards and potential chemical incompatibility.

Section 8 - Exposure Controls/Personal Protection (To Contents of cartridge)

Ventilation: Adequate ventilation is required to protect personnel from exposure to chemical vapors/dusts exceeding PEL and to minimize fire hazards. See Section 15 for regulatory standards of exposure. **Respiratory**: Wear NIOSH approved respirator with HEPA cartridges in the absence of proper environmental control. Type of respirator depends on level of exposure. **Eyes and Face**: Safety glasses with side shields are considered minimum protection. Chemical safety goggles or face shield may be necessary depending on quantity of material and conditions of use. Emergency eye wash fountains should be available in the vicinity of any possible exposure. **Skin**: Chemical-resistant protective gloves and clothing are recommended. The choice of protective gloves or clothing must be based on chemical resistance and other user requirements. Generally BUNA-N offers acceptable chemical resistance. Individuals who are acutely and specifically sensitive to this chemical may require additional protective clothing. Thoroughly wash clothing before reuse.

Section 9 - Physical and Chemical Properties (Contents of Cartridge)

pH (aqueous slurry): **about 8**
Flash Point (Method Used): **NA**
Explosion Potential: **LEL (NA) / UEL (NA)**
Bulk Density: **920-1400 kg/m3**
Melting Point (Degree C): **ND**
Odor Threshold: **ND**
Percent Volatile by Weight at 1000^{o}F**: ND**
Boiling Point (Degree C): **NA**
Vapor Pressure (mm Hg at 21.2^{O}C): **NA**
Vapor Density (Air =1) **NA**
Octanol/Water Partition Coefficient: **NA**
Solubility in Water: Insoluble (**X**) / Soluble ( )
Appearance and Odor: **Green, gray or black granules**

Section 10 - Stability and Reactivity

Stability: Stable the oxidized (depleted) form. Unstable if reduced (active) contents are exposed to oxygen or air.
Conditions to Avoid: The addition of moisture (water) to the contents without flooding can cause a rise in temperature from the heat of adsorption, and contact with skin might result in burns. Contact of the contents of the cartridges with air or moisture may generate sufficient heat of formation to ignite combustible materials. **Incompatibility (Materials to Avoid)**: Organic materials, combustible materials, aluminum powder, chlorates, chlorine trifluoride, hydrogen peroxide, permonosulfuric acid, potassium azide, rubidium

acetylene carbide, sodium peroxide, sulfur or other oxidizable materials. **Hazardous Decomposition or Byproducts**: No data available. **Hazardous Polymerization**: May Occur( )/Will Not Occur (x)

Section 11 - Toxicological Information

The contents of these cartridges are hazardous by inhalation, skin contact and ingestion. Ingestion of large quantities may cause stomach and intestinal distress. **Health Hazard Acute/Chronic:** This material gets hot as it absorbs water. Burns to moist body tissues can result if contact is prolonged. Ingestion of large amounts of **copper compounds** may cause increased salivation, vomiting, gastritis and diarrhea. **Copper oxide** has been known to produce testicular atrophy in rats at 0.01 – 1 mg/m3. Chronic exposure may result in anemia and damage to the liver, kidneys, lungs and spleen. Inhalation of **copper dusts** may cause temporary or permanent damage to the lungs. Inhalation of **magnesium oxide fumes** has been associated with "metal fume fever" characterized by coughing and chest pain. Chronic overexposure to copper compounds can lead to anemia High levels of exposure to **zinc dust, mists or fumes**, may cause "zinc chills" or "zinc fume fever" with symptoms of metallic or sweat taste, marked thirst, coughing, weakness, fatigue, muscular pain, nausea and vomiting, followed by fever, perspiration and chills, dyspnea, rales throughout the chest and tachycardia. Excessive Long term exposure to high concentrations of **manganese dioxide** dust may lead to a disease of the central nervous system, liver and kidneys. The offspring of female mice exposed to manganese dioxide dust before and after pregnancy demonstrated a reduction in adult weight, balance and coordination. Prolonged administration of manganese in the drinking water of rats resulted in fetotoxicity and mutagenic effects. The threshold dose was 0.005 mg/kg. Prolonged skin exposure to trivalent **chromium compounds** may cause dermatitis. Repeated inhalation exposure of up to 42 mg/m3 in animal studies have shown lung, liver and kidney damage. Chronic inhalation of **graphite** may result in graphite pneumoconiosis. Symptoms of graphite pneumoconiosis include black phlegm production, difficult breathing, and cough. Thirteen of nineteen workers in a **zinc powder** factory were reported to exhibit inflammation of the upper respiratory tract after 2 to 3 years of employment. Limited studies on the developmental toxicity of zinc oxide in animals indicate that doses as high as 200 mg/kg have caused reduced fetal body weight and fetal death.

Oral LD50 (rat): 1700 mg/kg.

For Manganese Dioxide: RTECS OP0350000
Oral LD50 (rat): >3,478 mg/kg
Inhalation TCLo (mouse): 49 mg/m3/7H (75D pre/1-18D preg)
Inhalation TCLo (rat): 1,800 µg/m3/24H/35D-C
Intravenous LDLo (rabbit): 45 mg/kg
Intratracheal LDLo (rat): 50 mg/kg
Subcutaneous LD50 (mouse): 422 mg/kg

Carcinogenicity: NTP? **No** IARC Monographs? **No (Group 3-CrO2)** OSHA Regulated? **No** OTHER? **No Medical Conditions**

Section 12 - Ecological Information

Persistence/Degradability: ND **Biodegradability**: ND **Bioaccumulation**: ND

Section 13 - Disposal Considerations

Do not open cartridges. Contents of cartridges should be treated as a RCRA characteristically hazardous waste (D001) unless all metallic fines are shown to be in the "oxidized" state. Dispose of this product in accordance with applicable local, state and federal regulations. Recover metal components by reprocessing whenever possible.

Section 14 - Transport Information

DOT Regulations:
Shipping Name: Self-heating solid, inorganic, n.o.s. (Activated Copper Oxide)
Hazard Class: 4.2 **UN ID:** 3190 **Packing Group**: II
See 49 CFR Ch.I § 173.4 for small quantity exceptions.

IATA Regulations:
Shipping Name: Self-heating solid, inorganic, n.o.s. (Activated Copper Oxide)
Hazard Class: 4.2 **UN ID:** 3190 **Packing Group**: II
See 49 CFR Ch.I § 173.4 for small quantity exceptions.

RID/ADR: ND **ADNR**: ND

Section 15 - Regulatory Information-Exposure Limits

Chemical Name	CAS #	OSHA PEL/TWA	ACGIH TLV/TWA	NIOSH REL/TWA	%Weight/ Weight
Copper oxide	[1317-38-0]	0.1 mg/m3 (Cu) (Fume) 1 mg/m3 (Cu) (Dusts & Mists)	1 mg(Cu)/m3 (as Copper)	0.1 mg/m3 (Cu)	<18%
Zinc oxide	[1314-13-2]	5 mg/m3 (Respirable fraction) 15 mg/m3 (Total Dust)	5 mg/m3(fume) ST: 10 mg/m3 (fume) 10 mg/m3(in-halable dust)	5 mg/m3 (fume) ST:10mg/m3 5 mg/m3 (Total dust) Ceiling:15 mg/m3	< 1%
Magnesium oxide	[1309-48-4]	15 mg/m3 (Total Particulate)	10 mg/m3	Not Estab.	<10%
Manganese dioxide	[1313-13-9]	Ceiling: 5 mg/m3 (Mn)	0.2 mg(Mn)/m3	Not Estab.	40-60%
Silicic Acid	[1343-98-2]	See PNOC	10 mg/m3 (Total Dust)	6 mg/m3	<15%
Barium oxide	[1304-28-5]	0.5 mg/m3 (Ba)	0.5 mg(Ba)/m3	Not Estab.	< 1%
Chromium oxide	[1308-38-9]	0.5 mg/m3 (Cr)	0.5 mg(Cr)/m3	Not Estab.	< 1%
Sodium oxide (PNOC) *(Particulate Not Otherwise Classified)* *Inert or Nuisance Dusts*	[1313-59-3]	5 mg/m3 (Respirable fraction) 15 mg/m3 (Total dust)	10 mg/m3	Not Estab.	<10%
Graphite	7782-42-5	15 mppcf Respirable Dust		2.5 mg/m3 respirable)	<10%

United States

OSHA Hazard Communication Standard (29 CFR 1910.1200): Hazardous? Yes.

SARA Reporting:

Section 302: None
Section 304: None
Section 313: Barium compounds; Chromium compounds; Zinc compounds; Copper compounds; Manganese compounds.

TSCA Regulations: All ingredients are on the TSCA inventory list.

Safe Drinking Water Act – Secondary Maximum Contaminant Levels: Manganese / 0.05 mg/L

CERCLA: No

Labeling Requirements:

Irritant. Do Not Open Cartridge.

State Regulatory Information

California Proposition 65: no

New Jersey / Pennsylvania / Massachusetts Right to Know:

Barium oxide 1304-28-5: Yes
Chromium oxide 1308-38-9: Yes
Magnesium oxide 1309-48-4: Yes
Sodium oxide 1313-59-3: No

Zinc oxide 1314-13-2: Yes
Copper oxide 1317-38-0: No
Silica 1343-98-2: No
Graphite 7782-42-5: Yes

New Jersey Right to Know List:
Manganese dioxide: Yes

Canada

All ingredients are listed on the DSL

European Union

All ingredients are listed in EINECS

Australia

All ingredients are listed in NICNAS

Switzerland

All ingredients are listed in Giftliste / EINECS

Section 16 - Other Information

Unless otherwise noted, the above information pertains only for the packing and similar types of components in the sample. When no toxicity data is provided, it is prudent to handle this chemical as hazardous. Furthermore, since individual chemical hypersensitivity cannot be predicted, every chemical should be handled with due respect.

European Information:
Classification: xN, R20/22
R 20/22: Harmful by inhalation and if swallowed.
S2: Keep out of the reach of children.
S25: Avoid contact with eyes.

KEY TO ABBREVIATIONS

ACGIH - American Conference of Governmental Industrial Hygienists`
ADNR - Regulations concerning the carriage of dangerous goods on the Rhine
CAS - Chemical Abstract Service
CRS – Chromatography Research Supplies, Inc.
DOT - US. Department of Transportation 49 Code of Federal Regulations
IARC - International Agency for Research on Cancer
IATA-DGR - International Air Transport Association- Dangerous Goods Regulation
LEL - Lower Explosion Limit
MPPCF – Million Particles Per Cubic Meter
NA - Not Applicable
ND - No Data
NIOSH - National Institute for Occupational Safety and Health
NTP - National Toxicology Program
OSHA - Occupational Safety and Health Administration
PEL - Permissible Exposure Limit
RID/ADR - Regulations Concerning the International Carriage of Dangerous Goods by Rail/European Agreement Concerning the international Carriage of Dangerous Goods by Road
TLV - Threshold Limit Value
TWA - Time Weighted Average
UEL - Upper Explosion Limit
[ ] - Indicates CAS Number