



MATERIAL SAFETY DATA SHEET

Section 1 - Product and Company Identification

Product Name: **CRS Advanced Filter System Cartridge**

CRS Part Numbers: **202900, 202910, 202920, 202930**

Date Revised: **6/3/08**

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

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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] 1-18%; Activated manganese dioxide [1313-13-9] 1 – 19%; Activated Carbon [7440-44-0] 20-30%; Activated manganese-exchanged molecular sieve 0.5 – 1%; and Molecular Sieve consisting of Sodium Oxide [1313-59-3] 8-14%; Aluminum Oxide (Non-fibrous) [1344-28-1] 16-28%; Silicon Oxide (synthetic) [7631-86-9] 26-46%; Calcium Oxide [1305-78-8] 8-14%; Quartz [14808-60-7] < 1%

Chemical Families: Reduced metallic oxides; sodium/calcium aluminosilicates and carbon adsorbent.

Chemical Synonyms: **Activated copper oxide** is also known as *copper(II)oxide*, *copper monoxide*, *copper monooxide*, *copper(2)oxide*, and *cupric oxide*. **Molecular Sieve** material is also known as *naturally occurring zeolite*. **Sodium oxide** is also known as *sodium monoxide*. **Aluminum oxide** is also known as *activated aluminum oxide*; *alpha-alumina*; and *aluminum sesquioxide*. **Silicon oxide** is also known as *silica*, *amorphous*; *precipitated amorphous silica*; *silica gel*; *silicon dioxide (amorphous)* **Calcium oxide** is also known as *burnt lime* and *quicklime*. **Activated carbon** is also known as *graphite*, *synthetic*. **Quartz** is also known as *silica*, *crystalline*; *crystalobalite*; *tridymite*; *Tripoli*.

Section 3 - Hazards Identification

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

Emergency Overview

Physical Appearance (contents of cartridge): Brown or black granules or powder and tan or off-white beads.

Immediate Concerns: Irritating to eyes. Prolonged or repeated contact may cause skin irritation. Prolonged or excessive inhalation may cause respiratory tract irritation. Prolonged or repeated overexposure may cause lung damage. Breathing large quantities of dust or fumes can cause "metal fume fever". Substance may be harmful if swallowed. May cause vomiting. Overexposure may cause kidney damage. May cause pancreatic disorder and damage. When first exposed to air or water, the product can heat up to the boiling point of water. Flood with water to cool material. Repeated and prolonged inhalation of crystalline silica in the form of quartz from occupational sources may cause cancer.

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

Potential Health Effects

Eyes: Irritating and may injure eye tissue if not removed promptly.

Skin: Irritation, rash, itching. May cause discoloration of the skin. The product gets hot as it first adsorbs air or water.

Ingestion: Harmful if swallowed. May cause vomiting. Overexposure may cause kidney damage. May cause pancreatic disorder and damage. The product gets hot as it first adsorbs air or water. Burns to moist body tissues can result if contact is prolonged.

Inhalation: Prolonged or repeated overexposure may cause lung damage. Prolonged or excessive inhalation may cause respiratory tract irritation. Repeated and prolonged inhalation of crystalline silica in the form of quartz from occupational sources may cause cancer.

Signs and Symptoms of Overexposure

Eyes: Scratch or abrasion, damage to cornea (necrosis).

Skin: Irritation, rash, itching, discoloration of the skin.

Ingestion: Nausea, vomiting.

Inhalation: Irritation of nose, throat and upper respiratory tract. Flu-like symptoms – fever, chills, nausea and vomiting, muscular aches and weakness; coughing, sneezing, bronchitis – can result from breathing high concentrations of dust or fume. Prolonged inhalation of manganese compounds above the ceiling exposure limit may cause lung irritation and central nervous system disorders. The symptoms simulate Parkinson's disease.

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Carcinogenicity Classification:

IARC (International Agency for Research on Cancer): Silicon oxide (synthetic) – Unclassifiable as to carcinogenicity in humans (Group 3). Inhaled crystalline silica in the form of quartz from occupational sources is carcinogenic to humans (Group 1).

NTP (U.S. National Toxicology Program): Quartz – Known human carcinogen.

OSHA (U.S. Occupational Safety and Health Administration): Quartz – Known carcinogen.

ACGIH (American Conference of Governmental Industrial Hygienists): Quartz – Suspected human carcinogen (A2).

Medical Conditions Aggravated: Respiratory system disorders, skin disorders, liver and kidney disorders, eye disorders, heart disease, blood disorders and Wilson's Disease. Iron deficiency may increase susceptibility to manganese poisoning.

Target Organ Statement: Respiratory system, lungs, skin, liver, pancreas, kidney.

Section 4 - First-Aid Measures

Eyes: Flush eyes with water for 15 minutes holding eyelids apart to ensure rinsing the entire surface. Get immediate medical attention.

Skin: Wash with soap and water. Get medical attention if irritation develops or persists. Remove contaminated clothing. Wash clothing before reuse. **Ingestion:** If victim is conscious give 3 – 4 glasses of water. Do not induce vomiting. Get immediate medical attention.

Inhalation: Remove to fresh air. Seek medical attention if cough or other symptoms develop or persist. **Notes to Physician:** There is an increased risk of inhalation of copper oxide with Wilson's disease. Inhalation of the FUMES of metal oxides may cause metal fume fever including irritation of the eyes and respiratory tract and flu-like symptoms. Prolonged or repeated contact under poor hygienic conditions may produce a papular, pustular eczema or dermatitis called oxide pox. This product is a desiccant and generates heat as it adsorbs water or oxygen. The used product can contain material of a hazardous nature. Identify that material and treat appropriately.

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. The material may increase the intensity of a fire involving other materials. Use extinguishing media appropriate to the surroundings. **Special Fire Fighting Procedures:** Wear full protective clothing and self contained positive pressure breathing apparatus in pressure-demand mode certified by MSHA/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:** May emit toxic fumes when heated to decomposition. When exposed to air or moisture, the contents of these cartridges may get quite hot, flooding will reduce temperature to a safe limit. For carbon: Contact with strong oxidizers such as ozone, liquid oxygen, chlorine, permanganate, etc., may result in fire.

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. Contents may get hot. 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. Exercise caution in the storage and handling of all chemical substances.

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

Engineering measure: Ensure adequate ventilation, especially in confined areas. **Personal protection equipment:** Handle in accordance with good industrial hygiene and safety practice. **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 classification N-100 with HEPA cartridges in the absence of proper environmental control and in operations where dusts exceed the TWA for manganese. Type of respirator depends on level of exposure. If respirators are worn, OSHA requires compliance with its respiratory protection program (29 CFR1910.134.) **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): ND	Flash Point (Method Used): NA
Explosion Potential: LEL (NA) / UEL (NA)	Bulk Density: 50-75 lbs./cubic foot
Melting Point (Degree C): Not Determined	Odor Threshold: ND
Percent Volatile: <10%	Boiling Point (Degree C): NA
Vapor Pressure (mm Hg at 21.2°C): NA	Octanol/Water Partition Coefficient: NA
Vapor Density (Air =1) NA	
Solubility in Water: Insoluble (X) / Soluble ()	
Appearance and Odor: Odorless, dark brown or black particulate solid and tan or off-white beads; odorless.	

Section 10 - Stability and Reactivity

Stability: Stable in the oxidized (depleted) form. Unstable if reduced (active) contents are exposed to oxygen or air.
Conditions to Avoid: The addition of oxygen, air or 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): Stable under normal temperatures and pressures in sealed containers. For contents: Sudden contact with high concentrations of chemicals having high heats of adsorption such as olefins, HCl, etc. For carbon: Strong oxidizers such as ozone, liquid oxygen, chlorine, permanganate, etc. Finely divided particles can result in fire or explosion when exposed to moisture. When heated, the contents of these cartridges can react explosively with magnesium or chlorinated rubber. For manganese and copper: Avoid contact with acids, 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. May initiate polymerization of monomers. May form unstable acetylides in contact with acetylene. **Hazardous Decomposition or Byproducts:** For carbon, carbon monoxide may be generated in the event of a fire. For molecular sieve, hydrocarbons and other materials that contact the molecular sieve during normal use can be retained on the sieve. It is reasonable to expect that decomposition products will come from these retained materials of use. The molecular sieve itself does not readily decompose unless subjected to extreme temperature or chemical conditions. If such decomposition were to occur the products would include the mix of oxides described in Section 2. **Hazardous Polymerization:** May Occur () / Will Not Occur (x)

Section 11 - Toxicological Information

Health Hazard Acute/Chronic: The reduced material as shipped in the cartridge gets hot on exposure to oxygen or air. After oxidation it may heat on adsorption of water. Burns to moist body tissues can result if contact is prolonged.
Oral LD50: 831 mg/kg. Mathematically derived oral toxicity value. >3,478 mg/kg (manganese dioxide (rat), RTECS OP0350000)
Inhalation TCLo (mouse): 49 mg/m³/7 H (75D pre/1-18D preg) (manganese dioxide)
Inhalation TCLo (rat): 1,800 µg/m³/24 H/35D-C (manganese dioxide)
Intravenous LDLo (rabbit): 45 mg/kg (manganese dioxide)
Intratracheal LDLo (rat): 50 mg/kg (manganese dioxide)
Subcutaneous LD50 (mouse): 422 mg/kg (manganese dioxide)
For manganese compounds: Prolonged administration of manganese in the drinking water of rats resulted in fetotoxicity and mutagenic effects. The threshold dose was 0.005 mg/k5.
LD50/oral/rat: > 32,000 mg/kg* (molecular sieve), >10,000 mg/kg (carbon)
LD/dermal/rabbit: > 2,000 mg/kg* (molecular sieve)
LC50/inhalation/rat: > 64.4 mg/L (nominal concentration, activated carbon)
Eye Effects: Alumina may cause injury to or disease of the cornea.
Skin Effects: Zinc oxide is a mild skin irritant by Standard Draize Test (500mg/24H rodent (rabbit))

Chronic toxicity: Classification of Ingredients

EC Carcinogenic: Not listed
EC Mutagenic: Not listed
EC Toxic for Reproduction: Not listed
Carcinogenicity (ACGIH): A4 (aluminum oxide); A2 (quartz)
IARC classification: Group 3 (silicon oxide – synthetic); Group 1 (quartz).
Carcinogenicity (NTP): Quartz
OSHA regulated: No

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Excessive inhalation of **copper dusts** may cause temporary or permanent damage to the lungs. Ingestion of large quantities may result in damage to the liver, pancreas, kidney or nervous system. Prolonged contact with the skin may result in irritation and possible dermatitis in sensitive individuals. Lung damage may result from inhalation of finely divided **aluminum oxide** particles.

Medical Conditions Generally Aggravated by Exposure: Breathing of dust may aggravate asthma and inflammatory or fibrotic pulmonary disease.

Manganese compounds, as Mn	1313-13-9	5 mg/m ³ (Respirable fraction) STEL N/E	TWA 0.2 mg/m ³ STEL N/E	TWA 1 mg/m ³ ST 3 mg/m ³	2-18%
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Section 12 - Ecological Information

Environmental Data: Inorganic manganese compounds have negligible vapor pressures but exist in air as suspended particulate matter, which settle under the influence of gravity. The transport of manganese in water is influenced by the solubility of the form present. Insoluble forms, such as manganese dioxide, are transported as sediments. The biomagnification of manganese in the food chain does not appear to be significant. May be harmful to the environment if allowed to directly enter water intakes. Clean up spills immediately. Notify proper authorities according to local, state and federal regulations.

Ecotoxicological Information:

Aquatic Toxicity (Copper Oxide):
LC50 (Morone saxatilis, newly hatched fry) = 310 µg/L (48 hr)

Chemical Fate Information: Copper is expected to significantly bioaccumulate. The experimentally derived bioaccumulation rate (BCF) for copper is >100.

Section 13 - Disposal Considerations

RCRA Waste Code: Contents of the cartridge are not regulated when in the oxidized state. Do not open cartridges. Contents 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. Materials of a hazardous nature that contact the product during normal use may be retained on this product. The user of the product must identify the hazards associated with the retained material in order to assess the waste disposal options.

Section 14 - Transport Information

Contains less than 30g self-heating solid, inorganic, n.o.s. (Activated Manganese dioxide and Copper oxide compounds)

DOT Regulations:

Shipping Name: Self-heating solid, inorganic, n.o.s. (Activated Manganese dioxide compound)
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 Manganese dioxide and Copper oxide compound)
Hazard Class: 4.2 **UN ID:** 3190 **Packing Group:** II
See IATA Section 2.7 for small quantity exceptions.

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

The carbon in this product has been tested according to the United Nations Transport of Dangerous Goods test protocol for spontaneously combustible materials. It has been specifically determined that the carbon material does not meet the definition of a self heating substance or any hazard class, and therefore is not a hazardous material and not regulated.

Section 15 - Regulatory Information

Exposure Limits

Chemical Name	CAS Number	OSHA PEL/TWA	ACGIH TLV/TWA	NIOSH REL	%WeightWt.
Copper oxide	1317-38-0	0.1 mg/m ³ (Cu) (Fume) 1 mg/m ³ (Cu) (Dusts and mist)	1 mg/m ³ (Cu) (as Copper)	0.1 mg/m ³ (Cu)	1-18%

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Chemical Name	CAS Number	OSHA PEL/TWA	ACGIH TLV/TWA	NIOSH REL	%WeightWt.
Silicon Oxide	7631-86-9	20 mppcf (80 mg/m ³ /%SiO ₂)	Not Established	TWA 6 mg/m ³	<26-46%
Sodium Oxide (See PNOC)	1313-59-3				< 8-14%
PNOC					



(Particulate Not Otherwise Classified) Inert or Nuisance Dusts		5 mg/m ³ Respirable Dust 15 mg/m ³ Total Dust	3 mg/m ³ Respirable Dust 10 mg/m ³ Total Dust	Not Established	
Aluminum Oxide (Non-fibrous)	1344-28-1	5 mg/m ³ Respirable Dust 15 mg/m ³ Total Dust	10 mg/m ³ Respirable Dust	Not Established	<16-28%
Calcium Oxide	1305-78-8	5 mg/m ³	2 mg/m ³	TWA 2 mg/m ³	<8-14%
Activated Carbon	7440-44-0	5 mg/m ³ Respirable Dust 15 mg/m ³ Total Dust	10 mg/m ³		20-30%
Quartz	14808-60-7	0.1 mg/m ³ Respirable Dust	0.025 mg/m ³ Respirable Dust	0.05 mg/m ³ Respirable Dust	< 1%

United States

SARA Title III (Superfund Amendments and Reauthorization Act) Reporting:

Section 302: None
 Section 304: None
 Section 311/312 Hazard Categories: Fire: Yes; Pressure Generating: No; Reactivity: No; Acute: Yes; Chronic: Yes
 Section 313: Reportable Ingredients: Copper oxide, Manganese dioxide.

CERCLA (Comprehensive Response, Compensation, and Liability Act)

CERCLA Regulatory: Contains ingredient(s) listed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) , 40 CFR 302.

CERCLA RQ: Copper, copper compounds, and manganese compounds are considered to be CERCLA hazardous and subject to CERCLA liability. However, there are no specific reportable quantities for generic copper or manganese compounds including copper oxide and manganese dioxide.

TSCA (Toxic Substance Control Act) Regulations: All ingredients are on the TSCA inventory list or are excluded or exempt.
RCRA Status: The contents of the cartridge in the oxidized, non-active state is not a RCRA hazardous. The contents should be considered a RCRA hazardous waste when in the active state. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations.

Clean Air Act: Appendix A: Hazardous Air Pollutants (Air Toxics): not listed.

Workplace Hazardous Materials Information System (CPR Section (33))

This product has been classified according to the hazard criteria of the Controlled Products Regulations, and the MSDS contains all required information.

Controlled Product; Classification: C, D2B

Labeling Requirements: Irritant. Do Not Open Cartridge.

The following components are listed in U.S. State Regulations:

State regulation reference:

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California – Proposition 65: Contains chemical(s) known by the State of California to cause cancer. (Silica, crystalline)
 Massachusetts Right-To-Know: Amorphous silica; Aluminum oxide; Calcium oxide; Quartz.
 Minnesota Hazardous Substance List: Present
 New Jersey Right-To-Know: Silica, amorphous; Aluminum oxide; Calcium oxide; Silica, quartz; Substance No. 1157.
 Pennsylvania Right-To-Know: Silica; Aluminum oxide; Calcium oxide; Quartz.
 Note: Other U.S. State Regulations may exist; check your local sources if available.

Canada

WHMIS Hazard Classification: D2A, WHMIS Poison

Canadian Hazardous Products Act: This product is classified as a material causing Other Toxic Effects, carcinogenicity – Class



D, Division 2, Subdivision A.

Canadian Environmental Protection Act: All the ingredients of this mixture are notified to CEPA and on the DSL (Domestic Substances List)

Canada Ingredient Disclosure List: Contains component(s) listed on the Canadian Hazardous Products Act Ingredient Disclosure List.

Additional Governmental Inventories

Australia – Inventory of Chemical Substances (AICS): All the ingredients of this mixture appear on the AICS.

Switzerland – Giftliste: All the ingredients of this mixture appear on the 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: Harmful

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