

# Engineering Data Sheet

8231

## Product: MetalSorb™ Heavy Metal Adsorbent

MetalSorb™ is a granular, magnesium-based adsorbent used to simultaneously neutralize and remove heavy metals from mildly acidic and alkaline wastewaters. During treatment, wastewater is passed through a filtration column or filter bed that houses specific amounts of adsorbent. The adsorbent removes soluble heavy metals by functioning as an ion exchange medium in which  $Mg^{+2}$  replaces the target metal in the wastewater.  $Mg^{+2}$  concentrations in the effluent are fairly constant at 20 mg/L regardless of the metal concentration in the influent. The pH of the effluent ranges from 8.0 to 10.1. MetalSorb™ is a superior heavy metal removal system to sand and mixed media filtration systems because of its ability to remove metals within both soluble and insoluble hydroxides.

MetalSorb™ is designed to remove heavy metals from wastewater with a pH greater than 4 and metal concentrations up to 50 mg/L. Heavy metals to be treated must exist as a cationic species and have lower aqueous solubilities than

the adsorbent. Metals having hydroxides more soluble than  $Mg(OH)_2$  cannot be removed (e.g., sodium hydroxide, potassium hydroxide, and calcium hydroxide). Anionic metals and metals existing as complexes (e.g. cyanides or chelates) cannot be effectively removed with MetalSorb™. In laboratory tests, the adsorbent has been shown to effectively treat wastewaters containing nickel, cadmium, chromium, copper, lead, zinc, silver, and other cations. The table below provides laboratory performance data.

Treated wastewater typically contains less than 0.5 mg/L of soluble metal. The adsorbent is supplied as a granular product. The size of the column for a particular application is dependent upon the pH, metal concentration, and flow rate of the influent stream. For wastewater with metal concentrations greater than 50 mg/L or pH less than 5, appropriate pretreatment is required (consult factory). MetalSorb™ may be used alone or in combination with other adsorbents.

**Laboratory Performance Data**

	Influent Concentration (mg/L)	pH	Effluent Concentration (mg/L)	Effluent pH Range	Empty Bed Contact Time (min.)
Aluminum	4.3	3.5	<0.02	9.0-10.1	8
Cadmium	128 to 190	5.05	<1.0	8.5-10.1	2
Chromium	2.0	3.5	0.1	9.0-10.1	8
Copper	200	5.5	<0.1	8.5-9.1	3.2
Lead	100	5.0	<0.5	9.1-10.1	0.7
Nickel	220	6.5	0 to 1.5	9.5-9.9	47.4
Silver	4.0	3.5	<0.02	9.0-10.1	8
Zinc	6.2	3.5	0.02	8.0-10.1	8

From the Engineering Department of  
**WaterSmart**  
**Environmental, Inc.**



# Material Safety Data Sheet

9083

## Product: MetalSorb™ Heavy Metal Adsorbent

*For emergencies involving spill, leak, fire or exposure, call 1-800-424-9300*

### Section I: Product Description

<i>Product Name:</i>	MetalSorb	<i>Synonyms:</i>	None
<i>Product Code:</i>	90-001H MAG	<i>Chemical Description:</i>	Magnesium Oxide
<i>Hazard Ratings:</i>	Health = 1, Fire = 0, Reactivity = 0, Equipment = -		
<i>Hazard Rating Scale: 0 = Least, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme</i>			

### Section II: Hazardous Components

<i>Hazardous Component</i>	<i>WT%</i>	<i>CAS Number</i>	<i>LD50 or LC50 (Species/Route)</i>
Magnesium Fume	60-100	01309-48-4	TCLo 400 mg/m <sup>3</sup> (human/ihl)

### Section III: Physical Properties

<i>Boiling Point (F)</i>	3582 C @ 760 mm H	<i>Freeze Point (F)</i>	Not applicable
<i>Specific Gravity (Water=1):</i>	3.5 to 3.6	<i>pH</i>	~10 saturated sol
<i>Vapor Pressure at 20C (mm of HG):</i>	~Zero at 20 C	<i>Vapor Density (Air=1):</i>	Not Applicable
<i>Evaporation Rate, N-BUDAC=1:</i>	Not applicable	<i>% Volatile (by VOL)</i>	Not applicable
<i>Solubility in Water:</i>	Slightly soluble	<i>Physical State</i>	Solid
<i>Odor thresh (ppm)</i>	Not determined	<i>Oil/Water Coeffic</i>	Not determined
<i>Appearance and Odor:</i>	Dry white powder to granular solid; no odor		

### Section IV: Fire and Explosion Data

<i>Flammability Classification:</i>	Not flammable	<i>Conditions of Flammability</i>	Not flammable
<i>Flash Point (Method): (TCC)</i>	Product is not flammable or combustible	<i>Auto-Ignition Temperature</i>	Not applicable
<i>LEL</i>	Not applicable	<i>UEL</i>	Not applicable
<i>Sensitive to Mechanical Impact?</i>	No	<i>Sensitive to Static Discharge?</i>	No
<i>Hazardous Combustion Products</i>	None known	<i>Unusual fire and explosion hazards</i>	None known
<i>Recommended Extinguishing Media:</i>	Use media appropriate to primary source of fire. Otherwise, use dry chemical, carbon dioxide, water spray or foam.		
<i>Special Fire Fighting Procedures:</i>	No special procedures; avoid breathing fumes or dust; keep upwind		

### Section V: Reactivity Data

<i>Stability:</i>	Stable	
<i>Conditions of Reactivity:</i>	Will react with incompatibles (see below)	
<i>Incompatibility :</i>	<i>Material to avoid</i>	<i>Hazardous Reaction</i>
	Acid (strong)	Vigorous reaction, heat generated
	Aluminum Powder	May ignite/explode when heated
	Bromine Pentafluoride	Violent reaction
	Chlorine Trifluoride	May ignite
	Interhalogens	May ignite
	Magnesium Powder	May ignite/explode when heated
	Oxidizers (strong)	Violent reaction
	Phosphorus Pentachloride	Incandescens brilliantly on heating
<i>Hazardous Decomposition Products:</i>	If magnesium oxide is heated to the point of volatilization (i.e., >1700°C), magnesium oxide <b>fumes</b> may be generated.	
<i>Hazardous Polymerization:</i>	Will not occur. No known conditions under which polymerization will occur.	

### Section VI: Toxicological/Health Hazard Data

<i>Routes of Entry</i>	Skin Contact: <b>Yes</b>	Skin Absorption: No	Eye Contact: No
	Inhalation: <b>Yes</b>	Ingestion: <b>Yes</b>	
<i>Exposure Limits</i>	Magnesium Oxide Fume	ACGIH: 10 mg/m <sup>3</sup>	
		OSHA: 15 mg/m <sup>3</sup> (total)	
<i>Effects of acute exposure</i>	Dust may irritate eyes, skin, nasal passages and respiratory tract. Inhalation of freshly generated magnesium oxide fume may result in metal fume fever. Ingestion generally causes purging of the bowels, however, swallowing large amounts may lead to bowel obstruction.		
<i>Effects of chronic exposure</i>	No data available on chronic exposure to magnesium oxide.		
<i>Signs &amp; symptoms of exposure</i>	Inhaled dust:	Sneezing coughing, discolored sputum	
	Inhaled fume:	Metal fume fever has influenza-like symptoms including fever, chills, perspiration, cough, nasal irritation, chest pain, nausea, head aches, vomiting and muscular weakness. Symptoms may be delayed 1-3 hours after exposure <i>however no reports of such exposures from industrial contact have been reported.</i>	
	Eye contact:	Redness, tearing, conjunctivitis	
	Skin contact:	drying, chapping, dermatitis	
<i>Medical conditions generally aggravated by exposure.</i>	As with exposure to any environment without adequate personal protection: inhalation of magnesium oxide dust or fume may aggravate any pre-existing respiratory disease; prolonged/frequent skin contact may lead to dermatitis.		
<i>Name of toxicologically synergistic product:</i> None known			
<i>Irritancy of product:</i> No data available			
<i>Reproductive toxin?</i> No	<i>Teratogen?</i> No	<i>Mutagen?</i> No	<i>Sensitizer?</i> No
<i>Considered Carcinogenic by</i>	<i>NTP?</i> No	<i>IARC?</i> No	<i>OSHA?</i> No

### Section VII: Preventative Measures

<i>Gloves</i>	Dust impervious gloves during manual handling of product.	
<i>Eyes</i>	Safety glasses with sideshields or tight fitting goggles.	
<i>Footwear</i>	Steel reinforced shoes when handling pallets of product.	
<i>Clothing</i>	Long sleeves, buttoned collar, long pants extended over shoes or coveralls.	
<i>Respiratory protection</i>	Up to 100 mg/m <sup>3</sup>	Any dust, mist or fume respirator; any air-supplied respirator; or self-contained breathing apparatus.
	Up to 250 mg/m <sup>3</sup>	Any supplied air respirator operated in a continuous flow mode or any powered air-purifying respirator with a dust/mist/fume filter.
	Up to 500 mg/m <sup>3</sup>	High efficiency particulate filter with full face piece; any powered air supplied respirator with a tight fitting face piece and a high efficiency particulate filter; any self contained breathing apparatus with a full face piece; any supplied air respirator with a full face piece.
	Up to 7500 mg/m <sup>3</sup>	Any air supplied respirator with full-face piece and operated in a pressure demand or other positive pressure mode.
	Emergency or entry into unknown concentrations	Self contained breathing apparatus with full face piece and operated in pressure demand mode or air supplied respirator with full face piece and operated in a pressure demand or other positive pressure mode in combination with auxiliary self contained breathing apparatus operated in pressure demand or positive pressure mode.
	Escape	Any air purifying full face piece respirator with high efficiency particulate filter or any appropriate escape type self contained apparatus.
<i>Specific engineering controls to be used with this product:</i>	Local and general mechanical dust collection and ventilation in accordance with good engineering practices should be provided to maintain dust levels below permissible exposure levels specified in Section IV (Page 3)	
<i>Procedures if Material is Spilled or Released:</i>	Ventilate enclosed spaces and use appropriate respiratory protection. Sweep or vacuum spilled material in a manner to avoid generation of dust. Reclaim product for re-use, if possible, or collect and seal in DOT approved containers for disposal in an appropriate manner.	
<i>Waste Disposal Procedures:</i>	Dispose of in accordance with local, state, and federal regulations.	
<i>Handling procedure and equipment</i>	Keep container closed when not in use. Avoid contact with eyes. Avoid breathing dust or fume and only use in a well-ventilated area. Consumption of food and beverages should be avoided in work area where product is being used. After handling product, always wash hands and face thoroughly with soap and water before eating, drinking or smoking.	
<i>Storage requirements</i>	Suitable for any general chemical storage area	
<i>DOT Shipping information</i>	Magnesite (calcined); non-regulated; no special precautions	

### Section VIII: First Aid Procedures

<i>Ingestion:</i>	Treat symptomatically. If bowel obstruction occurs, immediately consult a physician.
<i>Inhalation:</i>	Remove to fresh air immediately. Do not permit exposed person to remain in dusty environment without adequate respiratory protection. Treat metal fume fever with bed rest and treat for fever and pain.
<i>Eyes:</i>	Do not rub eyes. Wash eyes under slowly running water for at least 15 minutes, making sure eyes are held wide open and moved slowly in every direction. Ensure no solid particles remain in creases of eyelids. If so, continue to wash. If irritation persists, consult an ophthalmologist.
<i>Skin:</i>	Remove from source of irritation. Remove contaminated clothing and wash affected area thoroughly with a mild soap and water. Wash contaminated clothing before reusing.

<b>Section IX: Preparation Information</b>
--

<i>Prepared By:</i>	Linda Aydlett for Martin Marietta Magnesia Specialties
<i>Date Prepared:</i>	January 4, 1999
<i>Sources Used:</i>	ACGIH 1998
	RTECS June 1998
	Sax – 8 <sup>th</sup> Ed.
	Ind. Exposure & Control Tech. for OSHA Regulated Substances–MgO (fume), March 1989, pp 1181-1184
	NIOSH Occupational Health Guide for Chemical. Substances-Vol. II, September 1978

<b>Section X: Disclaimer</b>
------------------------------

The information herein is presented in good faith and believed to be scientifically correct as of the date hereof. However, WaterSmart Environmental, Inc makes no representation as to the completeness and accuracy thereof. Users must make their own determination as to the suitability of the product for their purposes prior to use.

No representations or warranties, either express or implied, of merchantability, fitness for a particular purpose or of any other nature with respect to the product or to the information herein is made hereunder. WaterSmart Environmental, Inc shall in no event be responsible for any damages of whatsoever nature directly or indirectly resulting from the publication or use of or reliance upon information contained herein.

