HI-Q ENVIRONMENTAL PRODUCTS COMPANY

Air Sampling Equipment, Systems & Accessories

Certificate of Conformance

Product:	Silver Impregnated Zeolite, Type Ag 400 G13
Mesh:	16 x 40 Mesh
Part Number:	AGX-4
Manufacturing Lot Number:	0507182-1
Purchase Order:	
Ref. Doc Number:	
Material Cure Date:	August 17, 2005
Retention Certificate Date:	October 20, 2005

HI-Q Environmental Products Company hereby certifies that the products supplied under the above-referenced Serial/Lot Number conform to the requirements of the purchase order as well as the physical characteristics specified by HI-Q Environmental Products Company published literature.

All process certifications, calibration procedures, and physical test reports are on file at our production facility and are available for review by your quality assurance personnel, if desired.

SHELF LIFE:

HI-Q Environmental Products Company's AGX & 844-42 series cartridges are heat sealed in a 6 mil polyurethane tubing, if left unopened, and not exposed to light or extreme temperatures, the shelf life of these cartridges should be at least 10 years. HI-Q Environmental Products Company suggests following the industry standard of replacing or re-certifying AGX & 844-42 series cartridges every 5 to 10 years. Once the cartridge packaging is opened, they should be used immediately or restored in an airtight package.

QUALITY ASSURANCE:

HI-Q Environmental Products Company manufacturers all of its cartridges under an **ISO 9001:2000 Certified** quality assurance program (see www.HI-Q.net for a copy of HI-Q's certificate). Following the procedures set forth in their Quality Assurance Program ensures repeatable performance and dimensions of each cartridge manufactured. HI-Q specifically has each individual lot of carbon and silver zeolite, from which the individual cartridges are made, randomly tested and certified by an independent testing laboratory at multiple sample flow rate points through the most common geometry of cartridges utilized in the nuclear industry. The Lot-Specific test results are included with each customer order.

Authorized Signature: _____ Ship Date: _____

7386 Trade St. / San Diego, CA 92121 / Phone: 858-549-2820 / 858-549-9657 / www.HI-Q.net

EFFICIENCY TESTING OF RADIOIODINE ANALYTICAL CARTRIDGES

INTRODUCTION

The testing of adsorbent media such as activated carbon and silver zeolite for use in analytical testing cartridges is done by using the test procedures outlined by the American Society for Testing and Materials - ASTM. This procedure uses a tagged gaseous compound called methyliodide as to determine the collection and retention efficiencies of the filter media. This ASTM method designated as D-3803, methods A-E, 1998 utilizes a fixed volume of media, 2" bed depth and the following conditions;

> Relative humidity (RH), 95%, Pre-humidification of media-16 hours, Pressure-one atmosphere, methyliodide concentration-1.75 mg/cubic meter, velocity of the gas stream-40 ft./sec.(appx.30 LPM), loading-2 hours, and post sweep-4 hours.
>
> Additionally, method A operates at a temperature of 30 degrees C, methods B & C at 80 and 130 degrees respectively. Methods D & E test the media under the same approximate conditions using molecular Iodine volatilized by sublimation and at temperatures of 30 & 180 degrees C.

Filter media can be of various mesh sizes, be impregnated with various amounts of chemical such as the chelating agent TEDA or with various amounts of silver in the silver zeolite media. This variability requires that extensive tests be conducted to define what the performance of a specific media might be under sampling conditions. The ASTM D3803 procedures are obviously intended only for comparison of fixed quantities of media under constant laboratory conditions. The results can then be compared to determine such things as pass or fail established minimum adsobtion efficiencies. These determinations are essentially one point analysis.

HI-Q has each batch of it's TEDA impregnated carbon and silver impregnated zeolite tested by an approved independent consulting laboratory for retention efficiencies of methyliodide using the ASTM method A, 1998 procedure. Each lot is provided with a collection efficiency certification.

ADDITIONAL TESTING

Environmental air sampling is never conducted under the same conditions as those used in a laboratory. This obviously is because one cannot control the environmental conditions. Media holding cartridges are of variable sizes, volumes and thicknesses than the test container used in the ASTM benchmark analysis. In using the analytical cartridges, there is no prehumidification for 16 hours, no fixed loading concentration or duration, no control of temperature, and most importantly, collection at a varied flow rate dependent on the scientists requirements. It is therefore obvious that there is little relationship between the ASTM test results and the prediction of collection efficiencies under actual field conditions.

In an effort to provide it's customers with realistic and usable data and estimates that can predict potential collection efficiencies at sampling conditions found in the field, HI-Q has instigated testing of its' cartridges beyond the ASTM D-3803 method A test point. These tests are conducted on the media under conditions that more closely approximated general sampling procedures.

The conditions used are;

1). The media is packed at a uniform packing density in a few different cartridge configurations: 2-1/4" diameter x 1" thick as in the TC-Series or AGX-2, 2-1/2" diameter x 1" thick as in the TCAL-Series or AGX-4, and 2-1/2" diameter x 1-1/2" thick TCGA-Series or AGX-10GA cartridges.

2). The test cartridge is not equilibrated or post flushed and is used right as taken from the sealed polypropylene shelf pack.

3). The temperature is maintained at 30 degrees C as in the ASTM procedure.

4). The methyliodide concentration is maintained at 1.75 mg./cubic meter as in the ASTM procedure.

5). Flow rates are varied and test points of 0.5, 1, 2, 3 and 4 CFM are established using the 8-16 mesh, 20-30 mesh, and 30-50 mesh TEDA impregnated carbon, or the 16-40 mesh silver exchange zeolite.

6). Relative humidity conditions are set at 95%.

The results of these tests are shown on the accompanying chart of flow rate vs. retention efficiency of methyliodide. In addition to the certified test analysis D-3803 method A, we also test for conformance to the field test program outlined above.

One other major aspect of sampling that we find necessary for your consideration, is that methyliodide is used as the test gas because it is volatile at ambient temperatures and is the smallest molecule with the poorest collection efficiency. Results then are close to a worst case scenario. Every other specie of iodine including molecular sublimed iodine has higher retention efficiency. In fact molecular iodine can and does condense on dust particles or cold surfaces which is termed particulate iodine. Methyliodide is a rare specie, if found at all, in the nuclear power generation environment.

CONCLUSION

While the ASTM D-3803 method A is a good comparative indicator of collection efficiency, additional tests are conducted by HI-Q that give indications of what one might expect to achieve in actual field test conditions.

HI-Q uses the highest quality coconut shell activated carbon impregnated with TEDA distributed by gas phase dispersion. The silver zeolite media is made by exchange of photographic grade 99.99% silver nitrate (Englehard) on 13X molecular sieve substrate. Moisture levels are maintained at ~10% in the AGX media.

Our cartridges will have slightly higher retention efficiency than other brands because our filter holders are thin wall and do not have a thick screen face that reduces the inner dimensions and volume of media. The TC-Series carbon cartridges contain approximately 24 grams of carbon and the TCAL-Series contains approximately 35 grams and the TCGA-Series contain about 60 grams of carbon.

HI-Q Environmental Products Company

Product: 16 x 40 Mesh, Silver Impregnated Zeolite

Lot Number: 0507182-1

Collection Efficiency Tests for:

Bulk Material

&

Cartridge Format @ varying flow rates

Methyl Iodide, CH_3I Tests

Qualification tests for the bulk silver impregnated zeolite material was conducted by Environmental Engineering & Testing, Inc. for HI-Q Environmental Products Company on purchase order number 7650 as per RDT-M16-IT and test method ASTM-D-3803-1989.

In addition to the standard "Bulk Material Collection Efficiency Tests", HI-Q Environmental Products Company has Environmental Engineering & Testing, Inc. perform additional collection efficiency tests of the silver impregnated zeollite in the cartridge format at varying flow rates. For this specific lot, those tests were performed on AGX-10GA cartridges at flow rates of 0.5, 1.0, 2.0, 3.0, & 4.0 CFM. The collection efficiencies for the AGX-10GA cartridges have historically tested higher than that of the AGX-4, and the collection efficiency of the AGX-2 have historically resulted in slightly lower retention efficiencies as those shown in the following AGX-4 flow vs. retention efficiency graphs.

Doc.: 107
Rev: C 1/6/05

molecular C*CHEM

Physical Properties Test Report

HI-O ENVIRONMENTAL PRODUCTS

Product: **IONEX®-TYPE Ag 400 G13**	Customer Part No.: **N/A**
Lot Number: **0507182-1**	Purchase Order: **7431**
Ref. Job Number: **905182**	Manufacture Date(s): **8/17/05**

Test Results		**ASTM Standard**
Moisture:	13.7%	D2867
Density:	0.91 g/ml	D2854
Ag Content:	38.3%	Fire Assay Testing By: HAZEN RESEARCH
Mesh Size:	16 x 40	D2862
+16	4.5%	
+18	29.2%	
+20	30.5%	
+30	30.1%	
+40	3.5%	
-40	2.3%	

NOTE: Test results are reported as lot averages; individual drum results may vary.

☐ *Note: Check box indicates information is obtained from base material certification or no in-house test was performed.*

Test Record #: 2691 Date: 08/17/05

Lab Technician: FL

QC Review By: J. GREEN

Authorization Signature: Pat Noble / SE

Date:

Patrick Noble, Q.A. Manager

Environmental Engineering & Testing, Inc.

P.O. Box 1012 Richland, WA 99352 (509) 554 2007

CERTIFIED REPORT

TEST RESULTS No. 6106 DATE: 10/18/2005 INVOICE No: C-1029

CUSTOMER: HI-Q ENVIRONMENTAL PROD.
7386 TRADE STREET
SAN DIEGO, CA 92121

PURCHASE ORDER 7650

ADSORBER TYPE: SILVER ZEOLITE CARTRIDGE AGX-10GA LOT# 0507182-1
16X40 MESH DENSITY: N/A g/cc

SAMPLE SOURCE: HI-Q

SAMPLE HISTORY: NEW RECEIVED 10/12/2005

TEMPERATURE: 30.0 +/- 0.1^{0}C PRESSURE: 104 +/- 5 kPa

RELATIVE HUMIDITY: 95 +/- 1% POLLUTANT TYPE: CH3I

FLOW RATE: 0.5 +/- 0.01 SCFM POLLUTANT CONCENTRATION: 1.75mg/M3

TEST METHOD: ASTM D-3803-98

PRE-EQUILIBRATION: 18 hr POLLUTANT LOAD: 1 hr ELUTION: 1 hr

SAMPLE WT (g): 142.2 DRIED WT: - POST TEST WT: 146.0 MOISTURE - %

SECTION No:	CUMULATIVE TEST BED	CUMULATIVE DECONTAMINATION EFFICIENCY IODINE	METHYL IODIDE
C-1	1" (1.5" deep)	%	99.99 +/- 0.10 %
C-2	2"	%	%
C-3	4"	%	%
C-x	BACKUP BEDS	%	%

REMARKS FACILITY 1 DIFFERENTIAL PRESSURE 1.6" water.

TECHNICIAN / REVIEWER

DR. J.D. LUDWICK, PRESIDENT

Environmental Engineering & Testing, Inc.

P.O. Box 1012 Richland, WA 99352 (509) 554 2007

CERTIFIED REPORT

TEST RESULTS No. 6104 DATE: 10/15/2005 INVOICE No: C-1029

CUSTOMER: HI-Q ENVIRONMENTAL PROD.
7386 TRADE STREET
SAN DIEGO, CA 92121

PURCHASE ORDER 7650

ADSORBER TYPE: SILVER ZEOLITE CARTRIDGE AGX-10GA LOT# 0507182-1
16X40 MESH DENSITY: N/A g/cc

SAMPLE SOURCE: HI-Q

SAMPLE HISTORY: NEW RECEIVED 10/12/2005

TEMPERATURE: 30.0 +/- 0.1°C PRESSURE: 104 +/- 5 kPa

RELATIVE HUMIDITY: 95 +/ -1% POLLUTANT TYPE: CH3I

FLOW RATE: 1.0 +/- 0.01 SCFM POLLUTANT CONCENTRATION: 1.75mg/M3

TEST METHOD: ASTM D-3803-98

PRE-EQUILIBRATION: 18 hr POLLUTANT LOAD: 1 hr ELUTION: 1 hr

SAMPLE WT (g): 142.3 DRIED WT: - POST TEST WT: 146.5 MOISTURE - %

SECTION No:	CUMULATIVE TEST BED	CUMULATIVE DECONTAMINATION EFFICIENCY IODINE	METHYL IODIDE
C-1	1" (1.5" deep)	%	99.45 +/- 0.14 %
C-2	2"	%	%
C-3	4"	%	%
C-x	BACKUP BEDS	%	%

REMARKS FACILITY 1 DIFFERENTIAL PRESSURE 6 mm Hg.

TECHNICIAN / REVIEWER

DR. J.D. LUDWICK, PRESIDENT

Environmental Engineering & Testing, Inc.

P.O. Box 1012 Richland, WA 99352 (509) 554 2007

CERTIFIED REPORT

TEST RESULTS No. 6107 DATE: 10/19/2005 INVOICE No: C-1029

CUSTOMER: HI-Q ENVIRONMENTAL PROD.
7386 TRADE STREET
SAN DIEGO, CA 92121

PURCHASE ORDER 7650

ADSORBER TYPE: SILVER ZEOLITE CARTRIDGE AGX-10GA LOT# 0507182-1
16X40 MESH DENSITY: N/A g/cc

SAMPLE SOURCE: HI-Q

SAMPLE HISTORY: NEW RECEIVED 10/12/2005

TEMPERATURE: 30.0 +/- 0.1°C PRESSURE: 104 +/- 5 kPa

RELATIVE HUMIDITY: 95 +/- 1% POLLUTANT TYPE: CH3I

FLOW RATE: 2.0 +/- 0.02 SCFM POLLUTANT CONCENTRATION: 1.75mg/M3

TEST METHOD: ASTM D-3803-98

PRE-EQUILIBRATION: 18 hr POLLUTANT LOAD: 1 hr ELUTION: 1 hr

SAMPLE WT (g): 142.2 DRIED WT: - POST TEST WT: 146.8 MOISTURE - %

SECTION No:	CUMULATIVE TEST BED	CUMULATIVE DECONTAMINATION EFFICIENCY IODINE	METHYL IODIDE
C-1	1" (1.5" deep)	%	97.38 +/- 0.09 %
C-2	2"	%	%
C-3	4"	%	%
C-x	BACKUP BEDS	%	%

REMARKS FACILITY 1 DIFFERENTIAL PRESSURE 17 mm Hg.

TECHNICIAN / REVIEWER

DR. J.D. LUDWICK, PRESIDENT

Environmental Engineering & Testing, Inc.

P.O. Box 1012 Richland, WA 99352 (509) 554 2007

CERTIFIED REPORT

TEST RESULTS No. 6105 DATE: 10/17/2005 INVOICE No: C-1029

CUSTOMER: HI-Q ENVIRONMENTAL PROD.
7386 TRADE STREET
SAN DIEGO, CA 92121

PURCHASE ORDER 7650

ADSORBER TYPE: SILVER ZEOLITE CARTRIDGE AGX-10GA LOT# 0507182-1
16X40 MESH DENSITY: N/A g/cc

SAMPLE SOURCE: HI-Q

SAMPLE HISTORY: NEW RECEIVED 10/12/2005

TEMPERATURE: 30.0 +/- 0.1^{0} C PRESSURE: 104 +/- 5 kPa

RELATIVE HUMIDITY: 95 +/- 1% POLLUTANT TYPE: CH3I

FLOW RATE: 3.0 +/- 0.03 SCFM POLLUTANT CONCENTRATION: 1.75mg/M3

TEST METHOD: ASTM D-3803-98

PRE-EQUILIBRATION: 18 hr POLLUTANT LOAD: 1 hr ELUTION: 1 hr

SAMPLE WT (g): 142.2 DRIED WT: - POST TEST WT: 146.7 MOISTURE - %

SECTION No:	CUMULATIVE TEST BED	CUMULATIVE DECONTAMINATION EFFICIENCY IODINE	METHYL IODIDE
C-1	1" (1.5" deep)	%	93.47 +/- 0.09 %
C-2	2"	%	%
C-3	4"	%	%
C-x	BACKUP BEDS	%	%

REMARKS FACILITY 1 DIFFERENTIAL PRESSURE 26 mm Hg.

TECHNICIAN / REVIEWER

DR. J.D. LUDWICK, PRESIDENT

Environmental Engineering & Testing, Inc.

P.O. Box 1012 Richland, WA 99352 (509) 554 2007

CERTIFIED REPORT

TEST RESULTS No. 6108 DATE: 10/20/2005 INVOICE No: C-1029

CUSTOMER: HI-Q ENVIRONMENTAL PROD.
7386 TRADE STREET
SAN DIEGO, CA 92121

PURCHASE ORDER 7650

ADSORBER TYPE: SILVER ZEOLITE CARTRIDGE AGX-10GA LOT# 0507182-1
16X40 MESH DENSITY: N/A g/cc

SAMPLE SOURCE: HI-Q

SAMPLE HISTORY: NEW RECEIVED 10/12/2005

TEMPERATURE: 30.0 +/- 0.1°C PRESSURE: 104 +/- 5 kPa

RELATIVE HUMIDITY: 95 +/- 1% POLLUTANT TYPE: CH3I

FLOW RATE: 4.0 +/- 0.04 SCFM POLLUTANT CONCENTRATION: 1.75mg/M3

TEST METHOD: ASTM D-3803-98

PRE-EQUILIBRATION: 18 hr POLLUTANT LOAD: 1 hr ELUTION: 1 hr

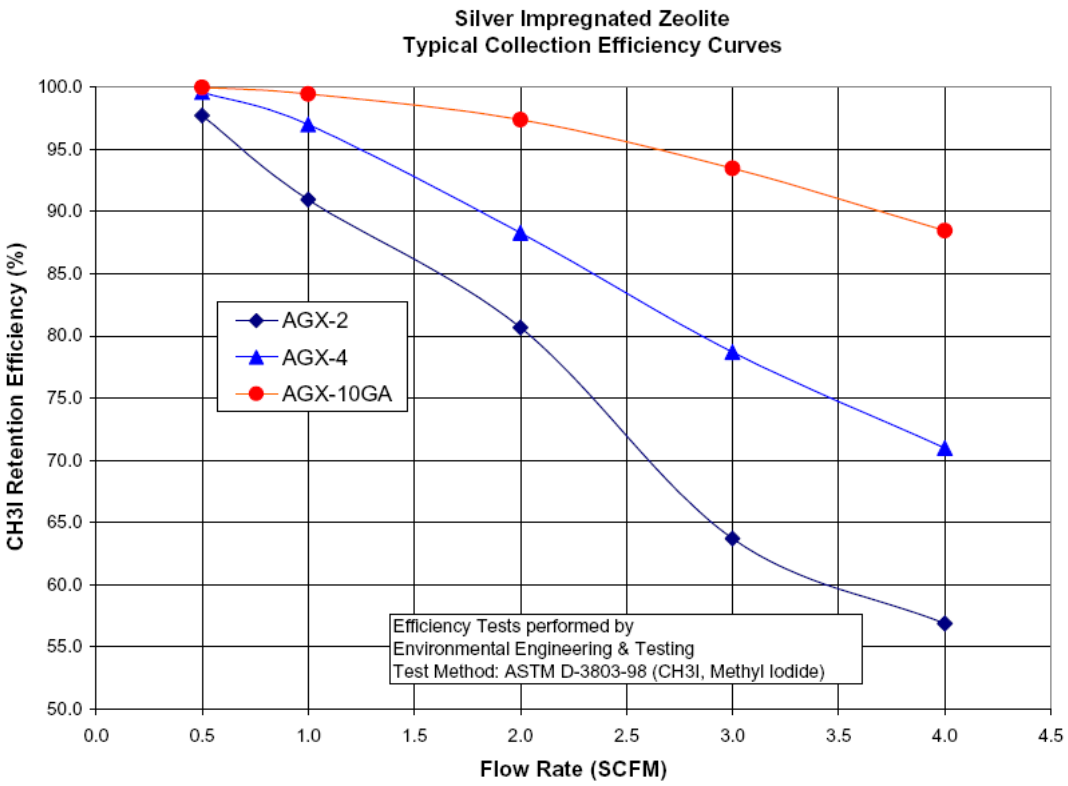
SAMPLE WT (g): 142.6 DRIED WT: - POST TEST WT: 146.6 MOISTURE - %

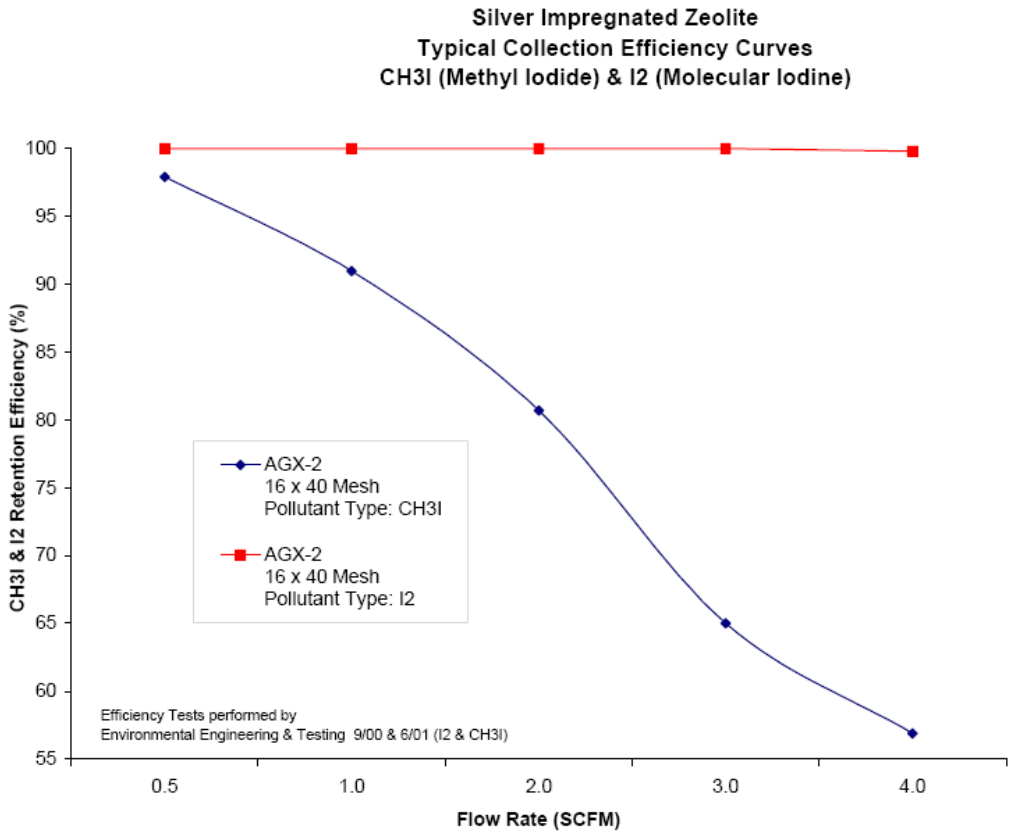
SECTION No:	CUMULATIVE TEST BED	CUMULATIVE DECONTAMINATION EFFICIENCY IODINE	METHYL IODIDE
C-1	1" (1.5" deep)	%	88.46 +/- 0.10 %
C-2	2"	%	%
C-3	4"	%	%
C-x	BACKUP BEDS	%	%

REMARKS FACILITY 1 DIFFERENTIAL PRESSURE 41 mm Hg.

TECHNICIAN / REVIEWER

DR. J.D. LUDWICK, PRESIDENT


Silver Impregnated Zeolite
Typical Collection Efficiency Curves
CH3I Retention Efficiency (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Flow Rate (SCFM)
AGX-2
AGX-4
AGX-10GA
Efficiency Tests performed by
Environmental Engineering & Testing
Test Method: ASTM D-3803-98 (CH3I, Methyl Iodide)


Silver Impregnated Zeolite
Typical Collection Efficiency Curves
CH3I (Methyl Iodide) & I2 (Molecular Iodine)
CH3I & I2 Retention Efficiency (%)
100
95
90
85
80
75
70
65
60
55
0.5
1.0
2.0
3.0
4.0
Flow Rate (SCFM)
AGX-2
16 x 40 Mesh
Pollutant Type: CH3I
AGX-2
16 x 40 Mesh
Pollutant Type: I2
Efficiency Tests performed by
Environmental Engineering & Testing 9/00 & 6/01 (I2 & CH3I)

molecular C*CHEM

MATERIAL SAFETY DATA SHEET
IONEX TYPE Ag-400

Doc.: 165
Rev.: C 6/01/04

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	IONEX TYPE Ag-400
Use/Size	Beads
Manufacturer/Supplier	Molecular C*Chem, a division of Molecular Products Inc.
Address	178 N. 120th Street Lafayette, CO 80026
Phone Number	(303) 666-4400 (Monday – Friday 7:00 am to 5:00 pm MT)
Revision Date:	June 1, 2004
MSDS Date:	June 25, 2002

This MSDS has been compiled in accordance with - EC Directive 91/155/EC - OSHA's Hazcom Standard (29 CFR 1910.1200)

2. COMPOSITION/INFORMATION ON THE COMPONENTS

Component Name	CAS#/Codes	Concentration	R Phrases	Classification
Silver, Ionic	20667-12-3 243-957-1	> 37%	R-None	None
Sodium Oxide	1313-59-3 215-208-9	< 2%	R-None	None
Silicon Oxide	7631-86-9 231-945-4	< 40%	R-None	None
Aluminum Oxide	1344-28-1 215-691-6	< 20%	R-None	None
Quartz	14808-60-7 238-878-4	< 3%	R49	T

R49: May cause cancer by inhalation.

3. HAZARD IDENTIFICATION

EU Main Hazards
May cause cancer by inhalation.

Routes of Entry
- Eye contact - Skin contact - Inhalation

Carcinogenic Status
Considered carcinogenic by NTP, IARC, and OSHA.

Target Organs
- Eye - Skin - Respiratory Tract - Liver

Health Effects - Eyes
Contact may cause conjunctival irritation.

Health Effects - Skin
Material may cause irritation.

Health Effects - Ingestion
May cause irritation to gastrointestinal tract. A large dose may cause liver damage.

3. HAZARD IDENTIFICATION

Health Effects - Inhalation
Exposure to dusts at high concentrations may cause irritation of nose throat and respiratory tract and may cause liver damage.

4. FIRST AID MEASURES

Eyes
Immediately flood the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.

Skin
Wash skin thoroughly with soap and water. Continue washing for at least 15 minutes. Seek medical attention if symptoms occur or redness persists.

Ingestion
Have victim drink 1-3 glasses of water to dilute stomach contents. Never administer anything by mouth if a victim is losing consciousness, is unconscious or is convulsing. Obtain medical attention immediately.

Inhalation
If there is difficulty in breathing, give oxygen. Seek medical attention if symptoms persist.

Advice to Physicians
Treat Symptomatically.

5. FIRE FIGHTING MEASURES

Extinguishing Media
Use foam, dry chemical or carbon dioxide.

Unusual Fire and Explosion Hazards
This product may give rise to hazardous fumes in a fire. When exposed to water, silver zeolites can become hot and heat to the boiling point of water. Flooding with water will reduce the temperature to safe limits

Protective Equipment for Fire-Fighting
Wear full protective clothing and self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

This product may be collected by carefully scooping into a pan, paper towel or other absorbent material. Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Transfer into suitable containers for recovery or disposal. Wear appropriate protective clothing.

7. HANDLING AND STORAGE

Keep container tightly closed when not in use. Avoid buildup of static charge in handling equipment. Do not get in eyes, on skin or on clothing. Avoid breathing dust. Storage area should be: - cool - dry - well ventilated - away from incompatible materials (see section 10 for materials to avoid)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Standards
Exposure limits are listed below, if they exist.

Silver Ionic (as soluble silver compounds)
ACGIH TLV: 0.01 mg/m3. **OSHA Permissible Exposure Limits (PELs):** 0.01 mg/m3 **UK TWA:** 0.01 mg/m3

Sodium Oxide
Not Established

Silicon Oxide (as particles not otherwise specified)
ACGIH TLV: 3 mg/m3 (respirable), 10 mg/m3 (inhalable) **OSHA Permissible Exposure Limits (PELs)** 5 mg/m3(respirable), 15 mg/m3 (total) **UK TWA:** 2.4 mg/m3 (respirable), 6 mg/m3 (inhalable).

Aluminum Oxide
ACGIH TLV: 10 mg/m3 **OSHA Permissible Exposure Limits (PELs)** 5 mg/m3 (respirable), 15 mg/m3 (total) **UK TWA:** 4 mg/m3

Quartz (silica-crystalline)
ACGIH TLV: 0.05 mg/m3 (respirable): **OSHA Permissible Exposure Limits (PEL):** 30 mg/m3 / %SiO2 + 5 (total) **UK TWA:** 0.3 mg/m3

Engineering Control Measures
Good general room ventilation is expected to be adequate to control airborne levels. If conditions are dusty, use local exhaust ventilation.

Respiratory Protection
NIOSH Approved dust respirator if conditions are dusty.

Hand Protection
Rubber gloves

Eye Protection
Chemical goggles or safety glasses with side shields

Body Protection
Normal work wear.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Granules or Beads
Color	White to Gray
Odor	Odorless
pH	No data
Specific Gravity	0.85-1.00
Boiling Range/Point (°C)	No data
Flash Point (PMCC) (°C)	Not Flammable
Explosion Limits (%)	Not flammable
Vapor Pressure	Not Applicable

9. PHYSICAL AND CHEMICAL PROPERTIES

Density	1.0 g/ml
Solubility in Water	Insoluble
Vapor Density (Air = 1)	Not Applicable
Melting Point (deg C)	Not Applicable

10. STABILITY AND REACTIVITY

Stability
Stable under normal conditions.

Conditions to Avoid
- Heat - High temperatures - contact with water or moisture as heat can be generated

Materials to Avoid
- Water and Moisture - Strong Reducing Agents

Hazardous Polymerization
Will not occur.

Hazardous Decomposition Products
- acrid smoke and irritating fumes - oxides of aluminum - oxides of silicon - oxides of sodium - oxides of silver

11. TOXICOLOGICAL INFORMATION

Acute Toxicity
Low order of acute toxicity predicted.

Chronic Toxicity/Carcinogenicity
There is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the form of quartz or cristobalite from occupational sources.

Genotoxicity
This product is not expected to cause any mutagenic effects. Silicon was not mutagenic to Salmonella typhimurium or Escherichia Coli.

Reproductive/Developmental Toxicity
This product is not expected to cause reproductive or developmental health effects.

12. ECOLOGICAL INFORMATION

Mobility
No relevant studies identified.

Persistence/Degradability
No relevant studies identified.

Bio-accumulation
No relevant studies identified.

Ecotoxicity
No relevant studies identified.

13. DISPOSAL

Dispose of in accordance with all applicable local and national regulations.

14. TRANSPORT INFORMATION

DOT CFR 172.101 Data	Not Regulated
UN Proper Shipping Name	Not Regulated
UN Class	None.
UN Number	None.
UN Packaging Group	None.
Classification for AIR Transportation (IATA)	Consult current IATA Regulations prior to shipping by air.

15. REGULATORY INFORMATION

EU Label Information

Classification and labelling have been performed according to EU directives 67/548/EEC and 99/45/EC including amendments.

EU Hazard Symbol and Indication of Danger

T: Toxic.

R phrases

R49: May cause cancer by inhalation.

S phrases

S22: Do not breathe dust.

US REGULATIONS (Federal, State) and INTERNATIONAL CHEMICAL REGISTRATION LAWS

TSCA Listing

All ingredients have been verified for inclusion on the EPA Toxic Substance Control Act Chemical Substance Inventory.

EINECS Listing

All ingredients in this product are listed on the European Inventory of Existing Commercial Chemical Substances (EINECS) or are exempt from listing.

DSL/NDSL (Canadian) Listing

All ingredients have been verified for inclusion on either the Domestic Substance List (DSL) or the Non-Domestic Substance List (NDSL).

WHMIS Classification

D.2.A

This product was classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations and the MSDS contains all the information required by these regulations.

California Proposition 65

This product contains materials which the State of California has found to cause cancer, birth defects or other reproductive harm. – Quartz (14808-60-7)

SARA Title III Sect. 302 (EHS)

This product does not contain any chemicals subject to SARA Title III Section 302.

15. REGULATORY INFORMATION

SARA Title III Sect. 304
This product does not contain any chemicals subject to SARA Title III Section 304.

SARA Title III Sect. 311/312 Categorization
This product meets the following SARA Title III Section 311/312 categorizations: Acute Hazard, Chronic Hazard

SARA Title III Sect. 313
This product contains the following chemicals that are listed in Section 313 at or above de minimis concentrations. – Silver Oxide (20667-12-3) – Aiuminum Oxide (1344-28-1)

16. OTHER INFORMATION

NFPA Ratings
NFPA Code for Flammability - 0
NFPA Code for Health - 1
NFPA Code for Reactivity - 0
NFPA Code for Special Hazards - 0

HMIS Ratings
HMIS Code for Flammability - 0
HMIS Code for Health - 1
HMIS Code for Reactivity - 0
HMIS Code for Personal Protection - See Section 8

Abbreviations
N/A: Denotes no applicable information found or available
CAS#: Chemical Abstracts Service Number
ACGIH: American Conference of Governmental Industrial Hygienists
OSHA: Occupational Safety and Health Administration
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
STEL: Short Term Exposure Limit
NTP: National Toxicology Program
IARC: International Agency for Research on Cancer
R: Risk
S: Safety
LC50: Lethal Concentration 50%
LD50: Lethal Dose 50%
BOD: Biological Oxygen Demand
KoC: Soil Organic Carbon Partition Coefficient

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