



# STANDARD OPERATING PROCEDURES

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REV: 1.0

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## OPERATION OF THE JEROME MODEL 431-X GOLD FILM MERCURY VAPOR ANALYZER

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### 1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to describe the operation, maintenance, and functional test procedures for the Arizona Instrument Corporation, Jerome Division, Model 431-X Gold Film Mercury Vapor Analyzers. The procedures and figures contained in this SOP are taken from the *Arizona Instrument Corporation, Jerome Division, Operation Manual (12/4/15)*. Some material is excerpted without change from this manual. This SOP will be used for educational and training purposes only.

The Jerome Model 431-X Mercury Vapor Analyzer is designed for the analysis of mercury vapor in the workplace environment and for the identification of the location of mercury spills. The instrument displays results digitally in units of milligrams of mercury per cubic meter of air ( $\text{mg Hg/m}^3$ ) and provides detection limits of approximately 1 microgram per cubic meter ( $\mu\text{g/m}^3$ ) ( $0.001 \text{ mg/m}^3$ ) with a useful range of 3 – 999  $\mu\text{g/m}^3$  ( $0.003 - 0.999 \text{ mg/m}^3$ ).

A Quality Assurance Project Plan (QAPP) in Uniform Federal Policy (UFP) format describing the project objectives must be prepared prior to deploying for a sampling event. The sampler needs to ensure that the methods used are adequate to satisfy the data quality objectives (DQOs) listed in the QAPP for a particular site.

The procedures in this SOP may be modified, dependent on site conditions, equipment limitations or other procedural limitations. In all instances, the procedures employed must be documented on a Field Change Form and attached to the QAPP. These changes must be documented in the final deliverable.

### 2.0 METHOD SUMMARY

A thin gold film, in the presence of mercury vapor, undergoes an increase in electrical resistance proportional to the mass of mercury vapor in the sample. The gold film is selective in its adsorption of elemental mercury, thus; eliminating interferences common to ultra-violet (UV) mercury analyzers such as water vapor, particulates, cigarette smoke, and organic solvents. When the SAMPLE button is pressed, an internal pump draws ambient air through a scrubber filter and into the flow system. After 2 seconds, the sample solenoid bypass opens, closing off the scrubber filter from the flow system. The sample air passes through a gas filter that removes acidic gases, which interfere with the sensor's response to mercury. The sample air is drawn over the gold film sensor and the sensor adsorbs mercury vapor. Nine seconds after starting, the sample solenoid bypass closes, and the remainder of the sample is drawn through the scrubber filter and flow system. The instrument determines the amount of mercury adsorbed and displays the measured concentration on the digital meter. The digital meter is automatically re-zeroed at the start of each sample cycle and the reading is frozen until the next sample cycle is activated, eliminating drift between samples.

Both instruments may be operated in either a **SURVEY** or **SAMPLE** mode. The **SAMPLE** mode produces optimum accuracy. The **SURVEY** mode is used to locate mercury spills or assess areas of potentially high mercury concentrations. Due to the decreased sample volume collected every 3 seconds, this mode is not as accurate as the **SAMPLE** mode.

Activating either the **SAMPLE** or **SURVEY** mode starts an internal pump which draws a precise volume of air over the Gold Film Sensor. The sensor adsorbs and integrates the mercury vapor and the measured concentration is then displayed on the digital meter in units of  $\text{mg Hg/m}^3$ .

As mercury adsorbs on the sensor, the percentage of sensor saturation is displayed on the digital display with a series of four horizontal bars, each illuminated bar representing an increase in sensor saturation from 0 to



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25 percent (%) (one bar) to 75-100% (four bars). Approximately 65 samples containing 0.1 mg Hg/m<sup>3</sup> may be taken while operating in the **SAMPLE** mode before the sensor reaches saturation. After absorbing approximately 0.50 milligrams of mercury, the sensor becomes saturated and needs to be cleaned. Following saturation, the sensor must be regenerated using a heating cycle (10 minutes) prior to the analysis of any additional samples. During the heating cycle, mercury desorbed from the sensor is removed from the instrument flow system by a final scrubber, preventing contamination from the desorbed mercury. Heat generated during regeneration may cause low level thermal drift, therefore, allow 30 minutes stabilization after regeneration before zeroing and using the instrument.

The Model 431-X will operate approximately six hours on fully charged batteries. The **SAMPLE** mode provides an integrated, direct reading of mercury vapor concentration in units of mg/m<sup>3</sup>. The **SURVEY** mode allows quick checks to locate high concentration areas.

### DIRECTORY OF DIGITAL METER DISPLAY CODES

MODEL 431-X	CODE EXPLANATION
000	Ready to sample
.000	No Mercury Vapor reading
00.0	No Mercury Vapor reading, display in nanograms
.8.8.8	Sensor saturated-regeneration needed
.H.H.H	Sensor regeneration in progress (.H.H.H flashes)
.L.L.L	Re-zero needed
.P.P.P	Power cord required or low line power, <100 VAC (or 200 VAC)
.H.L.P	High line power, greater than 130 VAC in 110 operation or 260 VAC in 220 operation
.LO BAT	Recharge batteries
.E.E.E	Same as LO BAT, automatically shuts off
.HL	Very high concentration has been detected. Refer to your safety policy for additional direction to confirm the concentrations.
.-	0-25% sensor saturation
.--	25-50% sensor saturation



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MODEL 431-X	CODE EXPLANATION
.---	50-75% sensor saturation
-.---	75-100% sensor saturation
DURING SAMPLING, USING SURVEY MODE	
-	Survey sampling (minus sign flashes) continuously
0	Zero, ready to sample
H	High, turn Zero potentiometer counterclockwise
L	Low, turn Zero potentiometer clockwise

### 3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this SOP.

### 4.0 INTERFERENCES AND POTENTIAL PROBLEMS

- The presence of acid gases in the sampled air stream may cause interferences.
- Organic mercury compounds, such as dimethylmercury, will interfere with the measurement of metallic vapor phase mercury.

### 5.0 EQUIPMENT/APPARATUS

The following equipment is required for the operation of the Jerome Model 431-X.

- Instruction Manual
- Power Cord (6000-4003)
- Battery Charger (4000-1011)
- Spare Battery Pack Assembly (Z4000-0907)
- Small Screwdriver for adjustments (Trimmer tool – 2300-0001)
- Tygon tubing - One foot of 1/8-inch I.D.
- Dosimeter Lead Set (2100-6017)
- Data Logger (Y990-0169)
- Jerome Communication Software Kit (JCS, Y990-0168)
- Trimmer Tool (2300-0001)
- Extension Probe, used to locate mercury vapor in hard to reach places (1400-2002)
- Zero Air Filter (Z2600-3905)
- Scrubber Filters (Z2600-3930)
- Intake Filter Disks (0.25-inch - 2600-3039)
- C/M Filter (2600-3928)
- Tubing Adapter (1400-3010)

Note: Battery recharge requires 14 hours.



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### 6.0 REAGENTS

The Functional Test Kit for Model 431-X (Part number [P/N Y431 – 0902]) contains liquid metallic mercury. No other reagents are required.

### 7.0 PROCEDURES

#### 7.1 Preparation

Check out and ensure the proper operation of the Gold Film Mercury Vapor Analyzer by performing the following steps:

1. Press **POWER ON**. Digital meter displays **.000**. (Disregard digital meter's momentary readings.) Recharge or replace the battery pack if the **LO BAT** indicator remains on.
2. Perform **SENSOR REGENERATION**. Thirty (30) minutes after sensor regeneration is complete, zero the instrument; while pressing **ZERO**, turn the **ZERO ADJUST** until the digital meter reads **.0**. If the display reads "H", turn the screw toward the "L" (counterclockwise); if it reads "L", turn clockwise toward the "H".
3. Press **SAMPLE**. The digital meter displays bars ( -, --, or --- ) indicating the amount of sensor saturation. At the end of the sampling cycle, the digital meter displays the mercury concentration in mg/m<sup>3</sup>.
4. The digital meter display will read between 0.000 and 0.003 if the Analyzer is operating properly.

#### 7.2 Sampling for Mercury

After performing **SENSOR REGENERATION**, allow the instrument to stabilize for 30 minutes to ensure maximum sample accuracy.

##### 7.2.1 Sample Mode

The **SAMPLE MODE** produces optimum accuracy and is the recommended mode for routine monitoring.

1. Press **SAMPLE**.
2. At the end of the sampling cycle read the digital meter. The number displayed at the completion of the sampling cycle is the mercury concentration in units of mg/m<sup>3</sup>. The digital meter automatically zeroes at the start of each sampling cycle.
3. Press power **OFF** when sampling activities are completed.



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### 7.2.2 Survey Mode

The **SURVEY MODE** does not provide accurate analysis of mercury concentrations. This mode is to be used to locate mercury spills or to assess areas of potentially high mercury concentrations.

1. Press and ***hold*** **SAMPLE**. The instrument takes a normal sample, displays the concentration and then goes into **SURVEY MODE**. The display flashes the concentrations approximately every three seconds.
2. When you are finished surveying, ***release*** **SAMPLE**. The final survey value remains displayed until the next sample is taken.
3. Approximately 65 samples at mercury concentrations of 0.1 mg/m<sup>3</sup> may be collected before a sensor regeneration is required.
4. Press power OFF when sampling activities are completed.

A probe may be plugged directly into the instruments intake to aid in locating mercury vapor in hard to reach places. The Jerome Model 431-X is intended for vapor use only. **DO NOT** allow the probe or the instrument's intake to come in contact with liquids, dust, or other foreign material.

### 7.3 Operating on Battery Power

Battery power facilitates operation of the Jerome Model 431-X as a portable instrument. If battery power is necessary for your use, please be aware of the following:

1. A fully charged battery pack provides power for 6 hours of continuous operation.
2. For operations lasting longer than 6 hours, additional fully charged battery packs are required.
3. If **LO BAT** appears in the digital display, change the battery pack. Refer to page 21 of the 431-X manual.
4. Complete battery recharging requires 14 hours.

### 7.4 Operating on a Power Supply or AC Power

For stationary use, the Model 431-X may be operated on AC power. If preferred for this type of use, the battery pack may be unplugged and removed completely. Operating the instrument only on AC power eliminates the need for the battery pack and its necessary maintenance.

### 7.5 Preventive Maintenance

To keep the Jerome Model 431-X operating at peak performance, follow this maintenance schedule:

Maintenance	Recommended Intervals
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Charge Batteries	After one month of storage, at the end of day's use, or when <b>LO BAT</b> appears. Replace batteries when they no longer maintain their charge.
Change Intake Filter Disc	Weekly or as needed
Change Internal Filters	After six months of use or as needed
Change Mercury Exhaust Filter (Scrubber)	Annually
Replace Zero Air Filter	Annually
Perform Functionality Check	After 20 hours of use or every three months
Send out for Factory Calibration	Annually

NOTE: Plug the **ZERO AIR FILTER** into the instrument's intake during storage.

### 7.6 Functional Test Procedures

Use this test if your application requires frequent verification of instrument functionality. This check must be done prior to field use to determine if the unit is functioning properly between annual calibrations. If the test results fall within the expected range, you may assume the instrument is functioning properly. This test **DOES NOT** calibrate the instrument. The Functional Test Kit, part number Y431 - 0902, is required for this procedure.

NOTE: Perform the functional test **ONLY** after a **SENSOR REGENERATION**.

1. Leave the thermos at stable room temperature for at least 2 hours. The temperature range for the test is 16 - 24 degrees Centigrade (°C). Temperature fluctuations during the test procedure will produce erratic results.
2. Replace the intake filter disc.
3. Replace the septum
4. Plug the septum assembly into the instrument's intake and tighten the intake tube nut to ensure an airtight seal.
5. Attach a **ZERO AIR FILTER** to the septum assembly.
6. Press power **ON**.
7. Take three samples. If the average meter reading is less than .005, continue to step 8. If the average meter reading is greater than .005, stop here and refer to the Model 431-X Operation Manual, Functional Test Trouble Shooting.
8. Note the temperature of the thermos.
9. Inject 1 cubic centimeter (cc) of mercury vapor (see Appendix B for syringe technique).



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10. Record the meter reading.
11. Repeat steps 9 and 10 three times. The results from last three 1cc injections should be within plus or minus ( $\pm$ ) 5% of each other. If not, refer to the Model 431-X Operation Manual for proper syringe technique, and repeat the procedure.
12. Refer to the Temperature Conversion Chart given below for the acceptable range of results. The average of the last three digital meter readings should fall within the range shown in the chart. If the average is within the range, the Jerome Model 431-X is functioning properly. If the average is not within range, proceed to the next step.
13. Perform **SENSOR REGENERATION**. Wait 30 minutes, then zero the instrument. While pressing **ZERO**, turn the **ZERO ADJUST**, using the trimmer tool until the digital meter reads .0.
14. Wait 1 hour before proceeding to step 15.
15. Repeat steps 9 to 12 of this procedure. If the average of the digital meter readings is still not within range, refer to the Model 431-X Operation Manual, Functional Test Trouble Shooting Section in Appendix A.

### TEMPERATURE CONVERSION CHART - MODEL 431-X

Temperature °C	Digital Meter Response
16	.091 to .123
17	.100 to .135
18	.108 to .146
19	.118 to .159
20	.129 to .174
21	.138 to .187
22	.151 to .204
23	.164 to .222
24	.177 to .240

### 8.0 CALCULATIONS

The Jerome Model 431-X is a direct reading instrument. The readings are displayed in units of mg Hg/m<sup>3</sup> and encompass the range from 0.001 to 0.999 mg Hg/m<sup>3</sup>.

### 9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the



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manufacturer unless otherwise specified in the QAPP. Equipment checkout and calibration activities (Appendix D) must occur prior to sampling/operation, and they must be documented.

3. Records must be maintained, documenting the training of the operators that use instrumentation and equipment, for the collection of environmental information.

The following specific QC activities apply:

1. Prior to field use, perform a functional test procedure.

### 10.0 DATA VALIDATION

Data verification (completeness checks) must be conducted to ensure that all data inputs are present for ensuring the availability of sufficient information. These data are essential to providing an accurate and complete final deliverable. The U.S. EPA Environmental Response Team (ERT) contractor's Task Leader is responsible for completing the UFP-QAPP verification checklist for each project.

### 11.0 HEALTH AND SAFETY

Based on Occupational Safety and Health Administration (OSHA) requirements, a site-specific health and safety plan (HASP) must be prepared for response operations under the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, [29 CFR 1910.120](#). Field personnel working for EPA's ERT should consult the Emergency Responder Health and Safety Manual currently located at <https://response.epa.gov/HealthSafetyManual/manual-index.htm> for the development of the HASP, required personal protective equipment (PPE), and respiratory protection.

Safety Data Sheets (SDS) documents are included in **Appendix C** for metallic mercury and chemical constituents of the sampling train scrubber and exhaust filter components.

### 12.0 REFERENCES

Arizona Instrument Corporation, Jerome Division. January 2011. *Jerome 431-X Mercury Vapor Analyzer Operation Manual*.

### 13.0 APPENDICES

- A – Functional Test Troubleshooting
- B – Syringe Injection Technique
- C – Material Safety Data Sheets
- D – Monthly Maintenance Checklist



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### APPENDIX A

Functional Test Troubleshooting

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### Functional Test Troubleshooting

If you don't achieve good results with the functional test procedure, check the following:

Results	Solution
Typically too high	Ensure the calibration vessel temperature is stable.
Too Low	Be sure to inject the Hg vapor ONLY after the display flashes (approximately 2 seconds after SAMPLE is pressed).
	Ensure there is no oxidation on the mercury drop in the calibration vessel. Gently swirl the mercury drop in the calibration vessel. Replace if necessary.
	Ensure the instrument's intake is not blocked with foreign matter. Check flow with a flow meter.
	Ensure syringe is calibrated to 1cc. Use a new syringe needle. Straighten or replace crimped or blocked internal tubing.

If you find the above does not solve your problem, please call AZI Customer Service at 800-5287411 or 602-470-1414.



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#### APPENDIX B

Syringe Injection Technique

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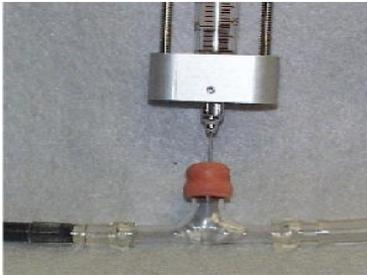
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#### SYRINGE INJECTION TECHNIQUE

1. Pull and hold the syringe plunger against the bar stop.
2. Verify that the black mark on the syringe plunger aligns with the 1 cc mark on the syringe barrel. If it does not, the holder assembly must be adjusted. Call AZI customer service at 602-281-1745 or 800-528-7411 for assistance.





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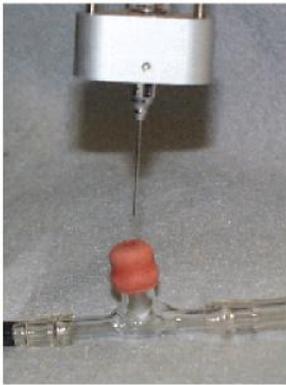
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3. Insert the needle into the needle-guide of the bottle stopper
4. Operate the plunger two or three times to pump mercury vapor into the syringe. On the final stroke, pull and hold the plunger against the bar stop.
5. Holding the plunger against the bar-stop, remove the syringe from the bottle and move it to the septum attached to the instrument intake.
6. Continue to hold the plunger against the bar-stop and insert the syringe into the septum. Press "SAMPLE" on the instrument.
7. When the display flashes, release the plunger and allow gravity to feed the mercury into the airstream. If the plunger stops, gently press it completely closed.
8. Remove the syringe needle from the septum.





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#### APPENDIX C

Material Safety Data Sheets

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Arizona Instrument  
Jerome Division

### MATERIAL SAFETY DATA SHEET

Date of Issue  
4-3-90

## Mercury

ARIZONA INSTRUMENT CORPORATION  
P.O. Box 1930  
Tempe, Arizona 85280  
INFORMATION HOTLINE (800) 528-7411

### Product Identification:

CHEMICAL NAME: Mercury Metal  
TRADE NAME & SYNONYMS: Quick Silver  
CHEMICAL FAMILY: Metals  
FORMULA: Hg  
FORMULA WEIGHT: 200.59

### SECTION 1 - Physical Data

formation  
ODOR: Odorless  
SPECIFIC GRAVITY (H<sub>2</sub>O = 1): 13.54  
VAPOR PRESSURE AT 20°C: 0.0012  
BOILING POINT, 760 mm Hg (°C): 356.9  
MELTING POINT (°C): -38.9

### SECTION 2 - Fire and Explosion Data

FIRE HAZARD: Nonflammable  
UNUSUAL HAZARDS: Extremely toxic vapors upon exposure to high temperatures

### SECTION 3 - Reactivity Data:

STABILITY: Stable at room temperature  
INCOMPATIBILITIES: azide, acetylene, ammonia, chlorine dioxide, nitric acid

### SECTION 4 - Leak/Spill Information

PRODUCT CLEAN-UP: recover with suction cup equipped with a capillary  
DISPOSAL METHOD: perform in compliance with all current local, state and federal regulations

### SECTION 5 - Health Hazard Information

THRESHOLD LIMIT VALUE:  
0.1mg/m<sup>3</sup> (OSHA ceiling)  
0.05mg/m<sup>3</sup> (ACGIH level with a proposed absolute ceiling of 0.15 mg/m<sup>3</sup>+)  
EXPOSURE/HEALTH EFFECTS: coughing, bronchitis, pneumonia, tremor, insomnia, irritability, headache, fatigue, weakness, stomatitis, weight loss, GI disorder. Can irritate skin and eyes.  
FIRST AID: skin - wash with water, get medical assistance; eyes - wash with water, get medical assistance; inhalation - remove to fresh air, get medical assistance; ingestion - get medical attention

### SECTION 6 - Special Protection Information

Ventilation must be sufficient to meet TLV. Wear rubber gloves and eye protection.

### SECTION 7 - Special Handling and Storing Precautions

Do NOT heat mercury unless appropriate safety precautions for highly toxic vapors have been taken. Store in a sealed container.

### SECTION 8 - Hazardous Ingredients

Mercury and Mercury Vapor

*The information and recommendations set forth herein are presented in good faith and believed to be correct as of the date hereof. Arizona Instrument Corporation, however, makes no representations as to the completeness or accuracy thereof and information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Arizona Instrument Corporation be responsible for damages of any nature whatsoever resulting from the use of or reliance upon this information.*



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Arizona Instrument  
Jerome Division

**MATERIAL  
SAFETY DATA SHEET**  
Date of Issue  
4-1-88

### Mallcosorb

ARIZONA INSTRUMENT CORPORATION  
P.O. Box 1930  
Tempe, Arizona 85260  
INFORMATION HOTLINE (800) 528-7411

#### Product Identification:

SYNONYMS: Soda lime solid; sodium hydroxide mixed with lime  
FORMULA CAS NO.: 8006-28-8  
MOLECULAR WEIGHT: N/A  
HAZARDOUS INGREDIENTS: N/A  
CHEMICAL FORMULA: N/A

#### Section 1 - Physical Data

APPEARANCE: White deliquescent pellets  
ODOR: Odorless  
BOILING POINT: No information found  
MELTING POINT: No information found  
VAPOR PRESSURE @ 20°C: Essentially zero  
SPECIFIC GRAVITY: No information found.

#### Section 2 - Fire and Explosion Data

FIRE: Not combustible, contact with moisture may generate heat to ignite combustibles.  
EXPLOSION: Possible when in contact with incompatible materials.  
FIRE HAZARD: Full protective clothing & NIOSH approved self-contained breathing apparatus.

#### Section 3 - Reactivity Data

STABILITY: Causes no hazardous decomposition products or hazardous polymerization.  
INCOMPATIBILITIES: Water, steam, acids, fluorine & many organics; contact with nitro compounds cause formation of shock-sensitive salts; contact with aluminum, tin & zinc cause formation of flammable hydrogen gas.

#### Section 4 - Leak/Spill Disposal Information

PRODUCT CLEAN-UP: Protective clothing & respiratory protection, scoop up spilled material, avoid dusting, neutralize traces with dilute acid.

DISPOSAL: Transfer to closed metal container & dispose of according to local, state & federal regulations. DO NOT CONTACT WITH WATER.

#### Section 5 - Health Hazard Information

OSHA Permissible Exposure Limit (PEL):  
Calcium Oxide 5 mg/m<sup>3</sup> (TWA)  
Sodium Hydroxide 2 mg/m<sup>3</sup> (TWA)  
ACGIH Threshold Limit Value (TLV): Sodium Hydroxide 2 mg/m<sup>3</sup> (TWA)  
Calcium Oxide 2 mg/m<sup>3</sup> (TWA)

EXPOSURE/HEALTH EFFECTS: Inhalation - upper respiratory tract damage, pneumonitis; ingestion - severe mouth, throat & stomach burns, severe tissue scarring & death may result; skin & eyes - irritation or severe burns, possible blindness resulting.

FIRST AID: **Inhalation** - remove to fresh air; if not breathing, give artificial respiration; if breathing is difficult, give oxygen; get medical attention. **Ingestion** - DO NOT INDUCE VOMITING! Give large quantities of water or milk; get medical attention immediately. **Skin & Eyes** - immediately flush with water for 15 min. minimum; remove contaminated clothing.

#### Section 6 - Special Protection Information

Ventilation must be sufficient to meet TLV. Wear rubber gloves & eye protection.

#### Section 7 - Storage and Special Information

Keep in tightly closed container, in cool, dry ventilated area, away from incompatible substances.

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## OPERATION OF THE JEROME MODEL 431-X GOLD FILM MERCURY VAPOR ANALYZER



Arizona Instrument  
Jerome Division

**MATERIAL  
SAFETY DATA SHEET**  
Date of Issue  
4-1-88

### Cupric Sulfate

ARIZONA INSTRUMENT CORPORATION  
P.O. Box 1930  
Tempe, Arizona 85280  
INFORMATION HOTLINE (800) 528-7411

#### Product Identification:

PRODUCT NAME: Cupric Sulfate, 5-Hydrate  
SYNONYMS: Copper Sulfate, Pentahydrate,  
Blue Vitriol  
FORMULA CAS NO.: 07758-99-8  
MOLECULAR WEIGHT: 249.68  
CHEMICAL FORMULA:  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$   
PRODUCT CODES: 1844, 1841, 1848, 1843

#### Section 1 - Physical Data

APPEARANCE & ODOR: Odorless blue crystals  
or granules.  
BOILING POINT: 150°C (302°C)  
MELTING POINT: 110°C (230°C)  
VAPOR DENSITY (AIR = 1): 8.6  
SOLUBILITY ( $\text{H}_2\text{O}$ ): Appreciable (more than  
10%)  
SPECIFIC GRAVITY: 2.28

#### Section 2 - Fire and Explosion Hazard Data

FIRE: Produces toxic gas - sulfur dioxide, keep  
away from heat.  
EXPLOSION: Closed containers exposed to  
heat may explode.  
FIRE HAZARD: Use extinguishing media ap-  
propriate for surrounding fire, full protective cloth-  
ing & NIOSH approved self-contained breathing  
apparatus, move exposed containers from fire  
area if it can be done without risk, if not, use  
water to keep fire-exposed containers cool.

#### Section 3 - Reactivity Data

STABILITY: Stable, no hazardous polymerization.  
CONDITIONS TO AVOID: Heat.  
INCOMPATIBILITIES: Strong reducing agents.  
DECOMPOSITION PRODUCTS: Oxides of  
sulfur

#### Section 4 - Leak/Spill Disposal Information

PRODUCT CLEAN-UP: Protective clothing &  
respiratory protection, scoop up spilled material,  
flush spill area with water.  
DISPOSAL: Transfer to clean, dry container &  
dispose of in accordance with local, state &  
federal environmental regulations.

#### Section 5 - Health Hazard Information

THRESHOLD LIMIT VALUE (TLV/TWA):  $1\text{mg}/\text{m}^3$   
TOXICITY:  $\text{LD}_{50}$  (oral-rat)  $\text{mg}/\text{kg}$  - 300  
 $\text{LD}_{50}$  (ipr-mouse)  $\text{mg}/\text{kg}$  - 33  
OVEREXPOSURE EFFECTS: skin or eyes -  
dust may ulcerate mucous membranes, contact  
may cause irritation, prolonged exposure may  
cause dermatitis. Ingestion may cause nausea,  
vomiting, or gastrointestinal pain.  
FIRST AID: ingestion - get medical attention, if  
conscious, immediately induce vomiting. Skin &  
Eyes - immediately flush with water for 15 min.  
minimum.

#### Section 6 - Special Protection Information

Use adequate general or local ventilation to  
meet TLV requirements. If airborne concentra-  
tions are high, use respirator or dust mask.  
Wear rubber gloves & eye protection.

#### Section 7 - Storage and Special Information

Keep in tightly closed container. Suitable for any  
general chemical storage area.

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forth herein are presented in good faith and  
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however, makes no representations as to  
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information is supplied upon the condition  
that the persons receiving same will make  
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for their purposes prior to use. In no event  
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Arizona Instrument  
Jerome Division

**MATERIAL  
SAFETY DATA SHEET**  
Date of Issue  
4-1-88

### Resisorb - Mercury Vapor Absorbent

ARIZONA INSTRUMENT CORPORATION  
P.O. Box 1930  
Tempe, Arizona 85280  
INFORMATION HOTLINE (800) 528-7411

#### Product Identification:

PRODUCT NAME: Resisorb - Mercury Vapor Absorbent  
FORMULA CAS NO.: 00000-00-0  
MOLECULAR WEIGHT: .00  
CHEMICAL FORMULA: Proprietary Mixture  
PRODUCT CODES: 4465

#### Section 1 - Physical Data

APPEARANCE & ODOR: Black solid with Halogen-like odor  
BOILING POINT: N/A  
MELTING POINT: N/A  
VAPOR PRESSURE: N/A  
SPECIFIC GRAVITY: N/A

#### Section 2 - Fire and Explosion Hazard Data

FIRE: Combustible, keep away from heat, sparks, flame.  
EXPLOSION: Contact with strong oxidizers may cause explosion.  
FIRE HAZARD: Use water spray to soak, class A extinguisher, full protective clothing & NIOSH approved self-contained breathing apparatus, move exposed containers from fire area if it can be done without risk, if not, use water to keep fire-exposed containers cool.

#### Section 3 - Reactivity Data

STABILITY: Stable, no hazardous polymerization.  
CONDITIONS TO AVOID: Heat, flame, sources of ignition.  
INCOMPATIBILITIES: Strong oxidizing agents, nitric acid, ammonia, alkali metals, strong reducing agents.

#### Section 4 - Leak/Spill Disposal Information

PRODUCT CLEAN-UP: Protective clothing & respiratory protection, scoop up spilled material, avoid dusting, flush spill area with water.  
DISPOSAL: Transfer to clean, dry container & dispose of in accordance with local, state & federal environmental regulations.

#### Section 5 - Health Hazard Information

OVEREXPOSURE EFFECTS: Dust may irritate skin or eyes, inhalation may cause tightness & chest pain, coughing & difficulty in breathing; Ingestion may cause nausea, vomiting, headaches.  
FIRST AID: Ingestion - get medical attention, if conscious, immediately induce vomiting. Skin & Eyes- immediately flush with water for 15 min. minimum; remove contaminated clothing.

#### Section 6 - Special Protection Information

Use adequate general or local ventilation to keep fume or dust levels as low as possible. If airborne concentration is high, use respirator or dust mask. Wear rubber gloves & eye protection.

#### Section 7 - Storage and Special Information

Keep in tightly closed container, in cool, dry ventilated area, away from heat, sparks or flame, isolate from incompatible substances.

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## OPERATION OF THE JEROME MODEL 431-X GOLD FILM MERCURY VAPOR ANALYZER

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### APPENDIX D

Monthly Maintenance Checklist

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January 2021



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## OPERATION OF THE JEROME MODEL 431-X GOLD FILM MERCURY VAPOR ANALYZER

### MONTHLY CHECK JEROME 431X Mercury Vapor Analyzer (REV. 11/19)

NAME: \_\_\_\_\_

DATE \_\_\_\_\_

EPA #: B11148

S/N#: 1140

Out on Work Assignment #: \_\_\_\_\_

Name of Work Assignment: \_\_\_\_\_

Date of **Last** Annual Calibration: \_\_\_\_\_

Date of **Next** Annual Calibration: \_\_\_\_\_

#### MONTHLY REQUIREMENT:

Activity	PASS	FAIL	REPLACED
Digital Display			
Battery			
Spare Battery			
Operation Test			
Regenerate Sensor	Yes	No	

**\*If an activity fails, explain in the comments section the actions taken**

#### OTHER MAINTENANCE:

Activity	Frequency	Completed	
Charge Unit	Monthly		
Charge Spare Battery	Monthly		
<b>Replace Battery</b>	As needed	Date Last:	Date Due:
<b>Change Internal Filters</b>	After 6 months of use/As needed	Date Last:	Date Due:
<b>Change Intake Filter Disc</b>	As needed	Date Last:	Date Due:
<b>Send Out for Factory Calibration</b>	Annually	Date Last:	Date Due:
<b>Change Zero Air Filter</b>	As needed	Date Last:	Date Due:
<b>Perform Functionality Check</b> Please read the instructions located in the front of the blue book (Appendix A). Perform the Functionality Check only after a sensor regeneration.	After 20 hrs. of use/Every 3 months  Vessel Temp: _____ °C	1st Reading:	mg/m <sup>3</sup>
		2nd Reading:	mg/m <sup>3</sup>
		3rd Reading:	mg/m <sup>3</sup>
		Avg. Reading:	mg/m <sup>3</sup>
<b>Change Hg Exhaust Filter (Scrubber)</b>	As needed	Date Last:	Date Due:



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## OPERATION OF THE JEROME MODEL 431-X GOLD FILM MERCURY VAPOR ANALYZER

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### CASE INVENTORY

Item	Part No.	Present (Y / N)
Data Logger		Y / N
Trimmer/Screwdriver Tool	2300-0001	Y / N
Data Logger Software		Y / N
Spare Battery	Z4000-0907	Y / N
Battery Charger	4000-1011	Y / N
Extension Probe	1400-2002	Y / N
Zero Air Filter	Z2600-3905	Y / N
Scrubber Filter	A2600-3930	Y / N
Intake Filter Discs	2600-3039	Y / N
Instruction Manual	N/A	Y / N
C/M Filter	Z2600-3928	Y / N
Power Cord	6000-4003	Y / N

\*\*\*IF ITEM IS MISSING, IT SHOULD BE REPLACED OR ORDERED\*\*\*

Instrument: PASSED RED TAGGED SENT TO MANUFACTURER:

Date:

Comments: