MATERIAL SAFETY DATA SHEET
Cat# K390-100 Iron Assay Kit
MSDS DATE: 11MAY2015

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Iron Assay Kit
PRODUCT CODES: Cat# K390-100
MANUFACTURER: BioVision, Inc.
DIVISION:
ADDRESS: 155 S. Milpitas Boulevard, Milpitas, CA 95035

EMERGENCY PHONE: 858-373-8066
CHEMTREC PHONE:
OTHER CALLS: 408-493-1800
FAX PHONE: 408-493-1801

SECTION 2: HAZARDS IDENTIFICATION

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Volume</th>
<th>Safety Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron Assay Buffer</td>
<td>Proprietary Buffer</td>
<td>25 ml</td>
<td>No hazards</td>
</tr>
<tr>
<td>Iron Probe</td>
<td>contains 3-(2-Pyridyl)-5,6-di(2-furyl)-1,2,4-triazine-5',5''-disulfonic acid disodium salt</td>
<td>1 vial</td>
<td>No hazards</td>
</tr>
<tr>
<td>Iron Reducer</td>
<td>contains Hydroxylamine hydrochloride: (&lt;10%)</td>
<td>1 vial</td>
<td>See below</td>
</tr>
<tr>
<td>Iron Standard (100 mM)</td>
<td>contains Iron(III) chloride</td>
<td>100 µl</td>
<td>See below</td>
</tr>
</tbody>
</table>

Hydroxylamine Hydrochloride:

Emergency Overview

GHS Classification: Corrosive to metals (Category 1), Acute toxicity, Oral (Category 4), Acute toxicity, Dermal (Category 4), Skin irritation (Category 2), Eye irritation (Category 2), Skin sensitisation (Category 1), Carcinogenicity (Category 2), Specific target organ toxicity - repeated exposure (Category 2), Acute aquatic toxicity (Category 1), Chronic aquatic toxicity (Category 1)

GHS Label elements, including precautionary statements

Pictogram:

Signal word: warning

Hazard statement(s):

H290 May be corrosive to metals.
H303: May be harmful if swallowed
H317: May cause an allergic skin reaction
H319: Causes serious eye irritation
H351 Suspected of causing cancer

Precautionary statement(s):

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P234 Keep only in original container.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P272 Contaminated work clothing should not be allowed out of the workplace.
P273 Avoid release to the environment.
P280 Wear eye protection/ face protection.
P280 Wear protective gloves/ protective clothing.
P281 Use personal protective equipment as required.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P302 + P352 + P312 IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P390 Absorb spillage to prevent material damage.
P391 Collect spillage.
P405 Store locked up.
P406 Store in corrosive resistant stainless steel container with a resistant inner liner.
P501 Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification

Health hazard: 2
Flammability: 0
Physical hazards: 1

NFPA Rating

Health Hazard: 2
MATERIAL SAFETY DATA SHEET
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Fire: 0
Reactivity Hazard: 1

Potential Health Effects
Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Skin: May be harmful if absorbed through skin. May cause skin irritation.
Eyes: May cause eye irritation.
Ingestion: May be harmful if swallowed.

Iron (III) Chloride:
Emergency Overview
GHS Classification: Corrosive to metals (Category 1), Acute toxicity, Oral (Category 4), Skin irritation (Category 2), Serious eye damage (Category 1), Acute aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements
Pictogram:

Signal word: warning
Hazard statement(s): H290 May be corrosive to metals.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H401 Toxic to aquatic life.

Precautionary statement(s):
P234 Keep only in original container.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P280 Wear eye protection/ face protection.
P280 Wear protective gloves.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 Take off contaminated clothing and wash before reuse.
P390 Absorb spillage to prevent material damage.
P406 Store in corrosive resistant stainless steel container with a resistant inner liner.
P501 Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification
Health hazard: 2
Flammability: 0
Physical hazards: 0
NFPA Rating
Health Hazard: 2
Fire: 0
Reactivity Hazard: 0

Potential Health Effects
Inhalation: May be harmful if inhaled. May cause respiratory tract irritation.
Skin: May be harmful if absorbed through skin. May cause skin irritation.
Eyes: May cause eye irritation.
Ingestion: May be harmful if swallowed.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS Number</th>
<th>EC-No.</th>
<th>Molecular Weight</th>
<th>Chemical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroxylamine HCl</td>
<td>5470-11-1</td>
<td>226-798-2</td>
<td>69.49</td>
<td>H3NO·HCl</td>
</tr>
<tr>
<td>Ferric chloride</td>
<td>7705-08-0</td>
<td>231-729-4</td>
<td>162.20</td>
<td>Cl3Fe</td>
</tr>
</tbody>
</table>

SECTION 4: FIRST AID MEASURES

General advice: Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.
If inhaled: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
In case of skin contact: Wash off with soap and plenty of water. Consult a physician.
In case of eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
If swallowed: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

SECTION 5: FIRE-FIGHTING MEASURES

Condition of flammability: Not flammable or combustible.
Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Special protective equipment for fire-fighters: Wear self-contained breathing apparatus for firefighting if necessary.
Hazardous combustion products: Hazardous combustion products formed under fire conditions—nitrogen oxides, hydrogen chloride.
SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions: Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions: Do not let product enter drains.

Methods for cleaning up: Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling
Avoid inhalation of vapor or mist. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature: -20 °C

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron trichloride</td>
<td>7705-08-0</td>
<td>TWA</td>
<td>1 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Remarks: Upper Respiratory Tract irritation; Skin irritation; varies

<table>
<thead>
<tr>
<th>Components</th>
<th>Value</th>
<th>TWA</th>
<th>USA. NIOSH Recommended Exposure Limits</th>
</tr>
</thead>
</table>

Hydroxylamine Hydrochloride:
Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin and body protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes, and clothing. Wash hands before breaks and immediately after handling the product.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES (Isopropanol)

<table>
<thead>
<tr>
<th>Property</th>
<th>Hydroxylamine HCl</th>
<th>Ferric Chloride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance:</td>
<td>white crystals</td>
<td>yellow solid</td>
</tr>
<tr>
<td>pH</td>
<td>2.5-3.5</td>
<td>No data available</td>
</tr>
<tr>
<td>Water Solubility:</td>
<td>soluble</td>
<td>No data available</td>
</tr>
<tr>
<td>Other Solubility:</td>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling Point (°C):</td>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>Melting Point (°C):</td>
<td>155 - 157 °C</td>
<td>304 °C</td>
</tr>
<tr>
<td>Flash Point (°C):</td>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>Ignition Temperature (°C):</td>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>Density:</td>
<td>1.67 g/cm³</td>
<td>2.800 g/cm³</td>
</tr>
</tbody>
</table>

SECTION 10: STABILITY AND REACTIVITY

<table>
<thead>
<tr>
<th>Property</th>
<th>Hydroxylamine HCl</th>
<th>Ferric Chloride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical stability:</td>
<td>Stable under recommended storage conditions</td>
<td></td>
</tr>
<tr>
<td>Conditions to avoid:</td>
<td>Air Exposure to moisture. May be unstable at temperatures above: 75° C</td>
<td>No data available</td>
</tr>
<tr>
<td>Materials to avoid:</td>
<td>Strong oxidizing agents, phosphorous pentachloride, Calcium, Anhydrous copper(II) sulfate</td>
<td>Strong oxidizing agents, Potassium, Alkali metals, Bases, Exothermic in contact with water, Forms shock-sensitive mixtures with certain other</td>
</tr>
</tbody>
</table>
SECTION 11: TOXICOLOGICAL INFORMATION

Hydroxylamine HCl:
Acute toxicity: LD50 Oral - Rat - 600 mg/kg
Inhalation: No data available
Dermal: No data available
Skin corrosion/irritation: No data available
Serious eye damage/eye irritation: No data available
Respiratory or skin sensitization: No data available
Germ cell mutagenicity: Rat - Embryo - Morphological transformation; Hamster - Lungs - Sister chromatid exchange
Carcinogenicity: Suspected human carcinogens
  IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
  ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
  NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
  OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
Reproductive toxicity: No data available
Teratogenicity: No data available
Specific target organ toxicity – single exposure (GHS): No data available
Specific target organ toxicity – repeated exposure (GHS): May cause damage to organs through prolonged or repeated exposure.
Aspiration hazard: No data available

Potential Health Effects
  Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
  Skin: Harmful if absorbed through skin. Causes skin irritation.
  Eyes: Causes eye irritation.
  Ingestion: Harmful if swallowed.

Signs and Symptoms of Exposure: To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Synergistic effects: No data available

Additional information: RTECS: NC3675000

Ferric Chloride:
Acute toxicity: LD50 Oral - Rat - 1300 mg/kg
Inhalation: No data available
Dermal: LD50 Dermal - Rabbit - > 2,000 mg/kg
Skin corrosion/irritation: Rabbit - irritation to skin
Serious eye damage/eye irritation: Rabbit - severe eye irritation
Respiratory or skin sensitization: No data available
Germ cell mutagenicity: No data available
Carcinogenicity: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
Reproductive toxicity: No data available
Teratogenicity: No data available
Specific target organ toxicity – single exposure (GHS): No data available
Specific target organ toxicity – repeated exposure (GHS): No data available
Aspiration hazard: No data available
Signs and Symptoms of Exposure: To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Synergistic effects: No data available
Additional information: RTECS: LJ9100000

SECTION 12: ECOLOGICAL INFORMATION

Hydroxylamine Hydrochloride:
Persistence and degradability: No data available
Toxicity: fish: LC50 - Leuciscus idus (Golden orfe) - 1 - 10 mg/l - 48.0 h
Bioaccumulative potential: No data available
Mobility in soil: No data available
PBT and vPvB assessment: No data available
Other adverse effects: Very toxic to aquatic life with long lasting effects.
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Ferric Chloride:
Persistence and degradability: no data available
Toxicity: fish: LC50 - Pimephales promelas (fathead minnow) - 21.84 mg/l - 96 h
daphnia: EC50 - Daphnia magna (Water flea) - 9.6 mg/l - 48 h
Bioaccumulative potential: no data available
Mobility in soil: no data available
PBT and vPvB assessment: no data available
Other adverse effects: Toxic to aquatic life. An environmental hazard cannot be excluded in the event of unprofessional handling or disposal

SECTION 13: DISPOSAL CONSIDERATIONS

Product: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
Contaminated packaging: Dispose of as unused product.

SECTION 14: TRANSPORT INFORMATION

Hydroxylamine Hydrochloride:
DOT (US):
UN number: 2923   Class: 8 (6.1)   Packing group: III
Proper shipping name: Corrosive solids, toxic, n.o.s. (Hydroxylamine hydrochloride)
Reportable Quantity (RQ): No
IMDG:
UN number: 2923   Class: 8 (6.1)   Packing group: III   EMS-No: F-A, S-B
Proper shipping name: CORROSIVE SOLID, TOXIC, N.O.S. (Hydroxylamine hydrochloride)
Marine pollutant: Yes
IATA:
UN number: 2923   Class: 8 (6.1)   Packing group: III
Proper shipping name: Corrosive solid, toxic, n.o.s. (Hydroxylamine hydrochloride)

Ferric Chloride:
DOT (US):
UN number: 1773   Class: 8   Packing group: III
Proper shipping name: Ferric chloride, anhydrous
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No
IMDG:
UN number: 1773   Class: 8   Packing group: III   EMS-No: F-A, S-B
Proper shipping name: FERRIC CHLORIDE, ANHYDROUS
Marine pollutant: Yes
IATA:
UN number: 1773   Class: 8   Packing group: III
Proper shipping name: Ferric chloride, anhydrous

SECTION 15: REGULATORY INFORMATION

Glucose Assay Kit II
OSHA Hazards: No known OSHA hazards
SARA 302 Components: SARA 302: No chemical in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components: SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title II, Section 313.
SARA 311/312 Hazards: Hydroxylamine Hydrochloride: Acute Health Hazard, Chronic Health Hazard
Massachusetts Right To Know Components: Iron trichloride: CAS-No. 7705-08-0 Revision Date 1993-04-24
Pennsylvania Right To Know Components: Hydroxylamine hydrochloride: CAS-No. 5470-11-1
Iron trichloride: CAS-No. 7705-08-0 Revision Date 1993-04-24
New Jersey Right To Know Components: Hydroxylamine hydrochloride: CAS-No. 5470-11-1
Iron trichloride: CAS-No. 7705-08-0 Revision Date 1993-04-24
California Prop. 65 Components: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

EU regulations:

<table>
<thead>
<tr>
<th>Component</th>
<th>Risk Phrases</th>
<th>Safety Phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydroxylamine HCl</td>
<td>R22, R36/38, R43, R50, R48/22</td>
<td>S22, S24, S37, S61</td>
</tr>
<tr>
<td>Ferric Chloride</td>
<td>R22, R34</td>
<td>S25, S36/37/39, S45</td>
</tr>
</tbody>
</table>

SECTION 16: OTHER INFORMATION

DISCLAIMER:
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. BioVision, Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.