FLUKE®

Calibration

5900E

Mercury Triple Point Cell

Users Guide

2004, Rev. 1, 4/11

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Limited Warranty & Limitation of Liability

Each Fluke product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is one year and begins on the date of shipment. Parts, product repairs, and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a Fluke authorized reseller, and does not apply to fuses, disposable batteries, or to any product which, in Fluke's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling. Fluke warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke does not warrant that software will be error free or operate without interruption.

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Fluke's warranty obligation is limited, at Fluke's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to a Fluke authorized service center within the warranty period.

To obtain warranty service, contact your nearest Fluke authorized service center to obtain return authorization information, then send the product to that service center, with a description of the difficulty, postage and insurance prepaid (FOB Destination). Fluke assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation prepaid (FOB Destination). If Fluke determines that failure was caused by neglect, misuse, contamination, alteration, accident, or abnormal condition of operation or handling, including overvoltage failures caused by use outside the product's specified rating, or normal wear and tear of mechanical components, Fluke will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer transportation prepaid and the Buyer will be billed for the repair and return transportation charges (FOB Shipping Point).

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11/99

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Before You Start

Symbols Used

Table 1 lists the International Electrical Symbols. Some or all of these symbols may be used on the instrument or in this manual.

Table 1. International Electrical Symbols

Symbol	Description	Symbol	Description
	Electric Shock	O	Off
	Hot Surface (Burn Hazard)	I	On
	Read the User's Manual (Important Information)		Fuse
	AC (Alternating Current)		Battery
	AC-DC	 N10140	C-TIC Australian EMC Mark
	DC		Canadian Standards Association
	Double Insulated	CE	CE Complies with European Union Directives
	PE Ground	**CAT II**	CAT II equipment is designed to protect against transients from energy-consuming equipment supplied from the fixed installation, such as TVs, PCs, portible tools, and other household appliances.

Safety Information

Use this instrument only as specified in this manual. Otherwise, the protection provided by the instrument may be impaired.

The following definitions apply to the terms "Warning" and "Caution".

- "Warning" identifies conditions and actions that may pose hazards to the user.
- "Caution" identifies conditions and actions that may damage the instrument being used.

⚠Warning

To avoid personal injury, follow these guidelines.

- **Mercury is corrosive. Consult the metal manufacturer's MSDS (Material Safety Data Sheet).**
- **Contains mercury, dispose properly.**
- **Federal law prohibits carrying this cell in the passenger section of a commercial airline. See MSDS in the back of this manual.**

⚠Caution

To avoid possible damage to the instrument, follow these guidelines.

- **Read the section entitled, Care and Handling Guidelines, before removing the gallium melting point cell from the case. Incorrect handling can damage the cell.**
- **The mercury triple point cell must be kept in a vertical position. Placing the cell in a horizontal position can damage the cell and void the warranty.**

How to Contact Fluke

To contact Fluke, call one of the following telephone numbers:

• Technical Support USA: 1-800-44-FLUKE (1-800-443-5853)

• Calibration/Repair USA: 1-888-99-FLUKE (1-888-993-5853)

• Canada: 1-800-36-FLUKE (1-800-363-5853)

• Europe: +31 402-675-200

• Japan: +81-3-3434-0181

• Singapore: +65-738-5655

• Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at www.fluke.com.

To register your product, visit http://register.fluke.com.

To see, print, or download the latest manual supplement, visit

http://us.fluke.com/usen/support/manuals.

Introduction

The International Temperature Scale of 1990 (ITS-90) is based on a series of defining fixed points. The triple point of mercury (TPHg) is one of the defining fixed points of the ITS-90. A triple point is the phase equilibrium state of solid, liquid, and vapor. The most common triple point used in the ITS-90 is the triple point of water. At temperatures below 273.16 K, most of the defining fixed points of the ITS-90 are the triple points. The TPHg is assigned the value 234.3156 K (–38.8344°C) by the ITS-90. Extremely pure mercury (99.999999%) can produce both freezing and melting techniques which give the triple point temperatures that agree to within ± 0.1 mK over most of the usable plateau. Since the triple point of mercury is notably below ambient, the melting curve is easier to realize with a longer plateau.

The fixed points are indispensable for the calibration of a standard platinum resistance thermometer (SPRT). Different subranges require different sets of fixed points. The ITS-90 specifies five subranges, in which SPRTs must be calibrated at the TPHg (Table 2).

Table 2. Some Subranges of the ITS-90 and the Fixed Points Required for Calibration

Subrange	Fixed Points Required
13.8033 K to 273.16 K	TP e-H_2, TPNe, TPO_2, TPAr, TPHg, and TPH_2O
24.5561 K to 273.16 K	TP e-H_2, TPNe, TPO_2, TPAr, TPHg, and TPH_2O
54.3584 K to 273.16 K	TPO_2, TPAr, TPHg, and TPH_2O
83.8058 K to 273.16 K	TPAr, TPHg, and TPH_2O
234.3156 K to 29.7646 K	TPHg, TPH_2O, and MPGa

For your convenience Fluke has developed a sealed TPHg cell according to BNM-INM design and technology, which makes it easier to realize the TPHg. The Fluke sealed TPHg cells will assist you immensely in realizing the TPHg in your laboratory.

Specifications and Environmental Conditions

Specifications

ITS-90 Assigned Temperature	234.3156 K (–38.8344°C)
Expanded Uncertainty (k=2)	0.2 mK
Purity of Mercury	99.999999+% (8N+)
Quantity of Mercury	2,000 g
Outer Diameter of the Cell	38.1 mm (1.5 in)
The Length of the Cell	246.0 mm (9.68 in)
The Total Length of the Cell with the Reentrant Well	400 mm (15.75 in)
Inner Diameter of the Reentrant Well	8.0 mm (0.315 in)
Total Immersion Depth in Mercury	210 mm
Total Length of the Reentrant Well	381 mm (15 in)
Case Material	304L Stainless Steel

Environmental Conditions

Although the instrument has been designed for optimum durability and trouble-free operation, it must be handled with care. The instrument should not be used in an excessively dusty or dirty environment.

Description

The Fluke TPHg cell is manufactured according to BNM-INM design and technology (Y. Hermier, G. Bonnier, “The Mercury Point Realization: Estimate of Some Uncertainties”, TMCSI, vol. 6, p. 287, 1992). During the manufacturing process, every cell is leak tested. After the cleaning and filling processes are complete, two small tubes adjacent to the central well are crimped and welded providing a sealed cell. A sealed cell is convenient in avoiding moisture condensation and contamination. An open cell with a bellow-sealed valve is available upon request. Sealed cells are more convenient for most users while open cells might be more preferable for some national laboratories.

304L stainless steel is chosen as the cell case material because it has been proven that it won’t contaminate high-purity mercury and it is much stronger than borosilicate glass. Stainless steel is preferred over borosilicate glass as the cell case material since mercury-in-borosilicate glass cells have been found to super cool about 6°C, while stainless steel cells super cool only 0.1°C to 0.3°C.

Care of Your Mercury Triple Point Cell

The mercury triple point cell is completely sealed and requires very little maintenance. It is suggested that the cell be kept in the vertical position for safety, although putting a cell in the horizontal orientation for a short time period will not cause any damage. Extended placement in a horizontal position may cause the mercury to come in contact with the welded closures and is not recommended.

Condensation on the outside of the cell should be removed before storage of the cell to prevent any corrosion.

The vacuum state of the cell produces a hydrostatic hammer as the mercury comes in contact with the cell walls. The hammer or “click” provides audible evidence that the cell integrity is in tact.

Realization of the Triple Point of Mercury

The purity of mercury used in the 5900E cell is 99.999999+%. At such high levels of purity both freezing and melting techniques yield triple-point values within ± 0.1 mK over most of liquid-solid range. Therefore, both freezing and melting techniques may be used for the realization of the triple point of mercury.

Since the triple point of mercury is about 60°C below room temperature, the melting technique is easier to realize and has a longer plateau. It is suggested that most users realize the triple point of mercury using the melting technique. The realization of metal fixed points with the lowest uncertainty generally requires two liquid-solid interfaces. In such a situation, the outer liquid-solid interface adjacent to the outer wall of the cell advances slowly as the solid continues to melt (the melting curve), or as the liquid continues to solidify (the freezing curve). Ideally this generates a shell of liquid phase (or solid phase) that continues to be of uniform thickness completely surrounding the solid mercury (or liquid mercury), which itself surrounds the inner liquid-solid interface that is adjacent to the thermometer well. With SPRTs, the inner liquid-solid interface, i.e., the equilibrium whose temperature is measured, must surround and be as close to the temperature sensing element as possible. An inner melting technique, which we will discuss in detail later, will create a continuous inner liquid-solid interface that is adjacent to the reentrant well.

The realization of the melting curve of the mercury triple point is accomplished in a bath with a minimum depth of 457 mm (18”), such as Fluke models 7341 and 7381 liquid baths. A serviceable plateau can be maintained for 8 hours in the 7341 bath and plateaus longer than 24 hours have been realized.

The length of the plateau is dependent upon the number of SPRTs being calibrated and the pre-cooling of the SPRTs.

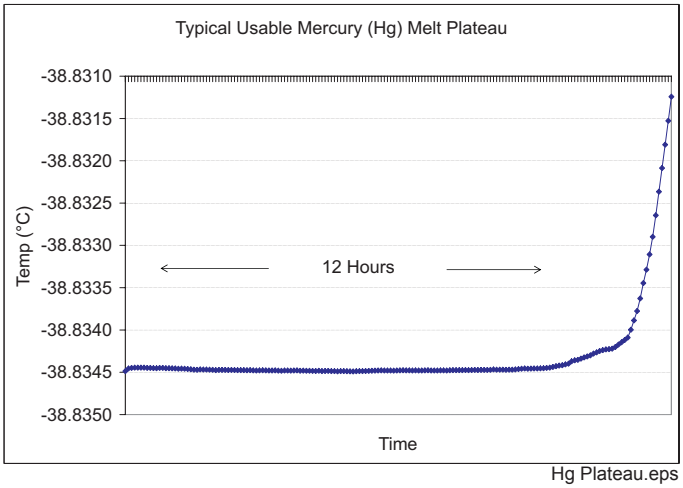


Figure 1. Typical Usable Mercury (Hg) Melt Plateau

In order to realize the mercury melting plateau in the 7341 bath, fill the cell reentrant well with alcohol and place the cell in the bath. You need to use the 2027-DCBM cell holder. Set the bath at -45°C. It will take approximately 2 hours for the cell to freeze. It may be convenient to freeze the cell overnight so that work can begin first thing in the morning. Your check standard should be placed in the well during the freeze. You may or may not be able to see the supercool depending on the thermal conditions. Set the bath to -40°C and maintain at that temperature until stable. Since calibration baths are not calibrated, the bath temperature will not be precise. Use the known value of the check standard at the mercury triple point to calculate the offset required for the bath to hold a temperature 50 m°C (50 mK) higher than the triple point of mercury (-38.8344°C). Use the calculated offset to set the bath temperature so that the check standard will read -38.784°C. Remove the check standard from the cell and place it in a pre-cool hole. Place a room temperature quartz glass rod or closed-ended tube in the reentrant well for 3 minutes to obtain an inner liquid-solid interface by melting the solid mercury immediately adjacent to the reentrant well surface. Remove the quartz-glass rod and replace the check standard. Wait 30 minutes to take the first reading. ALWAYS TAKE THE FIRST READING WITH THE CHECK STANDARD.

Proceed to calibrate the SPRTs. Check the condition of the melt after every three SPRT readings.

Note

Pre-chilling each SPRT to be calibrated is extremely important to maximize the length of the usable plateau.

Correction for the Pressure Difference

The triple point is realized at the vapor/liquid/solid interface. This occurs only at the uppermost surface of the mercury. Since mercury is extremely dense, considerable static head pressure is present at the bottom of the entrant well or measurement point. Therefore, a correction must be applied to the theoretical triple point temperature. ITS-90 gives all of the necessary coefficients for the calculation of the correction caused by the pressure difference, which are summarized in Table 3.

Table 3. Correction for Pressure Difference

Substance	Assigned Value of Equilibrium Temperature	Temperature with Pressure, p	Variation with Depth	Approximate
	T Kelvin (K)	K_1 ; dT/dp (10^{-5} mK/Pa)	K_2 : dT/dh (mK/m)	dW/dt
Argon (T)	83.8058	25	3.3	0.004342
Mercury (T)	234.3156	5.4	7.1	0.004037
Water (T)	273.16	–7.5	–.73	0.003989
Gallium (M)	302.9146	–2.0	–1.2	0.003952
rin0Indium (F)	429.7485	4.9	3.3	0.003801
Tin (F)	505.078	3.3	2.2	0.003713
Zinc (F)	692.677	4.3	2.7	0.003495
Aluminum (F)	933.473	7.0	1.6	0.003205
Silver (F)	1234.93	6.0	5.4	0.002841
Gold (F)	1337.33	6.1	10	—
Copper (F)	1357.77	3.3	2.6	—
(T) – triple point	(M) – melting point	(F) – freezing point		

The correction of temperature caused by the static head pressure can be calculated by using the following equation:

Equation 1: Static head pressure Correction

$$\Delta t = h \times k_2 (1)$$

$$K_1 = \frac{dT}{dp}$$

$K_2 = \frac{dT}{dh}$, 7.1 mK/m for the triple point of mercury

h: the immersion depth of the midpoint of the sensor of a SPRT into the matter used for the fixed point The immersion depth of the midpoint of a SPRT sensor in a mercury triple point cell is approximately 0.183 m The distance from the inner bottom of the central well to the surface of liquid metal is about 0.208 m. If the distance of the midpoint of the sensor from the tip of the sheath is 25 mm, the mean immersion depth of the SPRT sensor = 208 mm –25 mm = 183 mm. The temperature correction, Δt, can be calculated using Equation 1.

[Example] Equation 1 to calculate Δt becomes:

$$\Delta t = h \times k_2$$

Substituting values into Equation 1:

$$\Delta t = 0.183m \times \frac{7.1mK}{m}$$

Consequently:

$$\Delta t = 1.299mK = 0.001299K$$

Hence, the actual temperature of a sensor of a SPRT at the point of total immersion during a plateau in the cell is calculated using Equation 2.

Equation 2: Calculation of the Actual Temperature, t_1

$$t_1 = t + \Delta t(2)$$

Therefore:

$$t_1 = 234.3156K + 0.001299K = 234.316899K$$

where t is the assigned temperature value for TPHg, i.e. 234.3156K (–38.8344°C).

Material Safety Data Sheet

MSDS Number: **M1599** * * * * * *Effective Date:* ***11/02/01*** * * * * * *Supercedes:* ***11/17/99***

MSDS Material Safety Data Sheet

From: **Mallinckrodt Baker, Inc.**
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

MERCURY

1. Product Identification

Synonyms: Quicksilver; hydrargyrum; Liquid Silver
CAS No.: 7439-97-6
Molecular Weight: 200.59
Chemical Formula: Hg
Product Codes:
J.T. Baker: 2564, 2567, 2569, 2572
Mallinckrodt: 1278, 1280, 1288

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Mercury	7439-97-6	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

MSDS1.eps

Potential Health Effects

Inhalation:
Mercury vapor is highly toxic via this route. Causes severe respiratory tract damage. Symptoms include sore throat, coughing, pain, tightness in chest, breathing difficulties, shortness of breath, headache, muscle weakness, anorexia, gastrointestinal disturbance, ringing in the ear, liver changes, fever, bronchitis and pneumonitis. Can be absorbed through inhalation with symptoms similar to ingestion.
Ingestion:
May cause burning of the mouth and pharynx, abdominal pain, vomiting, corrosive ulceration, bloody diarrhea. May be followed by a rapid and weak pulse, shallow breathing, paleness, exhaustion, tremors and collapse. Delayed death may occur from renal failure. Gastrointenstinal uptake of mercury is less than 5% but its ability to penetrate tissues presents some hazard. Initial symptoms may be thirst, possible abdominal discomfort.
Skin Contact:
Causes irritaton and burns to skin. Symptoms include redness and pain. May cause skin allergy and sensitization. Can be absorbed through the skin with symptoms to parallel ingestion.
Eye Contact:
Causes irritation and burns to eyes. Symptoms include redness, pain, blurred vision; may cause serious and permanent eye damage.
Chronic Exposure:
Chronic exposure through any route can produce central nervous system damage. May cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Can cause skin allergies and accumulate in the body. Repeated skin contact can cause the skin to turn gray in color. A suspected reproductive hazard; may damage the developing fetus and decrease fertility in males and females.
Aggravation of Pre-existing Conditions:
Persons with nervous disorders, or impaired kidney or respiratory function, or a history of allergies or a known sensitization to mercury may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full

MSDS2.eps

facepiece operated in the pressure demand or other positive pressure mode. Undergoes hazardous reactions in the presence of heat and sparks or ignition. Smoke may contain toxic mercury or mercuric oxide. Smoke may contain toxic mercury or mercuric oxide.

6. Accidental Release Measures

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapor.

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate misting. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Do not flush to sewer. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker CINNASORB® and RESISORB® are recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Do not use or store on porous work surfaces (wood, unsealed concrete, etc.). Follow strict hygiene practices. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Acceptable Ceiling Concentration:
mercury and mercury compounds: 0.1 mg/m3 (TWA), skin
- ACGIH Threshold Limit Value (TLV):
inorganic and metallic mercury, as Hg: 0.025 mg/m3 (TWA) skin, A4 Not classifiable as a human carcinogen.
- ACGIH Biological Exposure Indices:
total inorganic mercury in urine (preshift): 35 ug/g creatinine;
total inorganic mercury in blood (end of shift): 15 ug/l.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face respirator with a mercury vapor or chlorine gas cartridge may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with a mercury vapor or chlorine gas cartridge may be worn up to 50 times the exposure limit, or the maximum use concentraiton specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Silver-white, heavy, mobile, liquid metal.
Odor:
Odorless.
Solubility:
Insoluble in water.
Density:
13.55
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
356.7C (675F)
Melting Point:
-38.87C (-38F)
Vapor Density (Air=1):
7.0
Vapor Pressure (mm Hg):
0.0018 @ 25C (77F)
Evaporation Rate (BuAc=1):
4

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
At high temperatures, vaporizes to form extremely toxic fumes.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Acetylenes, ammonia, ethylene oxide, chlorine dioxide, azides, metal oxides, methyl silane, lithium, rubidium, oxygen, strong oxidants, metal carbonyls.
Conditions to Avoid:
Heat, flames, ignition sources, metal surfaces and incompatibles.

11. Toxicological Information

Toxicological Data:
Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
All forms of mercury can cross the placenta to the fetus, but most of what is known has been learned from experimental animals. See Chronic Health Hazards.
Carcinogenicity:
EPA / IRIS classification: Group D1 - Not classifiable as a human carcinogen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Mercury (7439-97-6)	No	No	3

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12. Ecological Information

Environmental Fate:
This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material is expected to significantly bioaccumulate.
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are less than 1 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 1LB

International (Water, I.M.O.)

Proper Shipping Name: MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 1LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Mercury (7439-97-6)	Yes	Yes	No	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Mercury (7439-97-6)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Mercury (7439-97-6)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)

MSDS5.eps

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  Mercury (7439-97-6)                          1          U151       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
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WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 2Z
Poison Schedule: S7
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
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