Alternatives of Mercury & its Products.

By

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Mercury has been used in a variety of consumer products because it exhibits properties of both a metal and liquid at room temperature. It is a good conductor of electricity and it reacts precisely to temperature and pressure changes.
Mercury Containing Products/ Products Categories

• Appliances
• Automobiles
• Button Cell Batteries
• Chemical Compounds
• Computer
• Dental Amalgam
• Electronics-Miscellaneous
• Film
• Heating/ Cooling Equipment
• Industrial Machinery
• LCDs/ Monitors/ Projectors
• Lights Bulbs

Conti..........

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• Light Fixtures
• Measuring Devices
• Office Equipments
• Pumps
• Sensors
• Thermometers
• Toys
• Transducers
• Valves
Mercury Components Within Products

- Buttons Cell Batteries
- Leveling Systems
- Light bulbs
- Mercury- Compounds
- Mercury – Elemental
- Relays
- Sensors
- Switches
- Thermostats
- Transducers
- Values
Industrial Sectors

- Chemical Manufacturing
- Computer and Electronics Manufacturing
- Electrical Equipment, Appliance, and Component Manufacturing
- Electronics and Appliance Stores
- Fabricated Metal Products Manufacturing
- Furniture and Home Furnishing Stores
- Machinery Manufacturing
- Miscellaneous Manufacturing
- Motor Vehicle and Parts Dealers

Conti.............

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• Nonmetallic Mineral Products Manufacturing
• Printing and Related Support Activities
• Professional, Scientific, and Technical Services
• Transportation Equipment Manufacturing
• Wholesale Trade, Durable Goods
• Wholesale Trade, Nondurable Goods
• Power Sector
Lighting

Fluorescent Lamps/tubes/ High Intensity Discharge Lamps
(10-50 mg Hg, 20-250 mg Hg)
Alternatives:
Ordinary glow lights; LEDs
low sodium vapor tubes (yellow);
optical, high-energy, long-lasting lights
Clinical

Thermometers:
(0.5-3.0 g Hg)

Alternatives:
• Liquid-in-glass thermometers
• Dial thermometers
• Electronic thermometers
  (thermocouple and resistance thermometers)
• Infrared thermometers
Examples

Gas Filled Thermometer

Digital Thermometer
**Manometers**

Alternatives:

- Bourdon tube manometers
- Electronic manometers (or digital manometers)
- Pressure gauges with diaphragm elements
Examples

Dwyer Magnehelic Difference Manometer

Dwyer Handheld Digital Manometer

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Dental amalgams
Alternatives:
Gold, ceramics, porcelain and Polymers

Batteries
Defibrillators, Hearing aids
Pacemakers
Alternatives:
Lithium, zinc-air, alkaline
Appliances

Gas Range
Freezer
(Switch, Flame Sensor)

Alternatives:
Electronic (digital)
Blood Pressure Measuring Equipment

Alternatives:

• Aneroid Sphygmomanometers for manual reading
• Semiautomatic devices for clinical use
• Automatic blood pressure devices for hospital use
Example

Welch Allyn Maxi Stabil 3 aneroid sphygmomanometer.

Greenlight 300 electronic sphygmomanometer
Barometers
(40-100 g Hg)

Alternatives:

- Electronic barometers based on vibrating cylinder air pressure transducers
- Electronic resistance or capacitance barometers
- Aneroid mechanical barometers
Example

Vaisala PTB220 Series Digital Barometer
Thermostats

(3 g Hg)

Alternatives

Programmable electronic thermostat
Electrical equipments:
Alternatives:
Fiber optics, solid state devices, mechanical switches
Flame sensors

(1-2 g Hg)
Alternatives
Electronic flame sensors
Switches

(3.5 g Hg, Industrial switches upto 8 pound Hg)

Alternatives

Hard-contact switches, solid state switches, electro-optical switches, inductive sensors, capacitive sensors, photoelectric sensors, and ultrasonic sensors.
Laboratory

- Mercury (II) chloride
- Zenker's solution
- Histological fixatives

Alternatives:
- Zinc formalin, Freeze drying
Staining solutions and preservatives:

Thimerosal, Immu-sal, Carbol-fuchin stain, Gram iodine stain, Phenolic mercuric, Acetate, Alum, Hematoxylin "Solution A"

Alternatives:
Replace with a variety of chemical compounds
<table>
<thead>
<tr>
<th>Mercury (II) oxide</th>
<th>Copper catalyst</th>
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</thead>
<tbody>
<tr>
<td>Mercury oxide</td>
<td>None identified</td>
</tr>
<tr>
<td>Mercury (II) chloride</td>
<td>Magnesium chloride/sulfuric acid</td>
</tr>
<tr>
<td>Mercury (II) sulfate</td>
<td>Silver nitrate/potassium sulfate/chromium-(III) sulfate</td>
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<tr>
<td>Mercury iodide</td>
<td>Phenate method</td>
</tr>
<tr>
<td>Mercury nitrate (for corrosion of copper alloys)</td>
<td>Ammonia/copper sulfate</td>
</tr>
<tr>
<td>Colorimetric chloride analysis</td>
<td>Ion-selective electrode method</td>
</tr>
</tbody>
</table>
Power sector

• Coal Burning
   An individual cement plant is emitting an average 50 kg of mercury in the environment. A recent study shows that coal being used contains mercury in the range of 20-200 ppb

• Alternatives
   Coal Cleaning, Hydro, Hydrogen, nuclear, etc.
Thank you

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