Public Health Response to Mercury Spills

Brendan Boyle, Newgrange Communication

For

MEHA

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Questions and Quizzical Looks

Welcome! ?

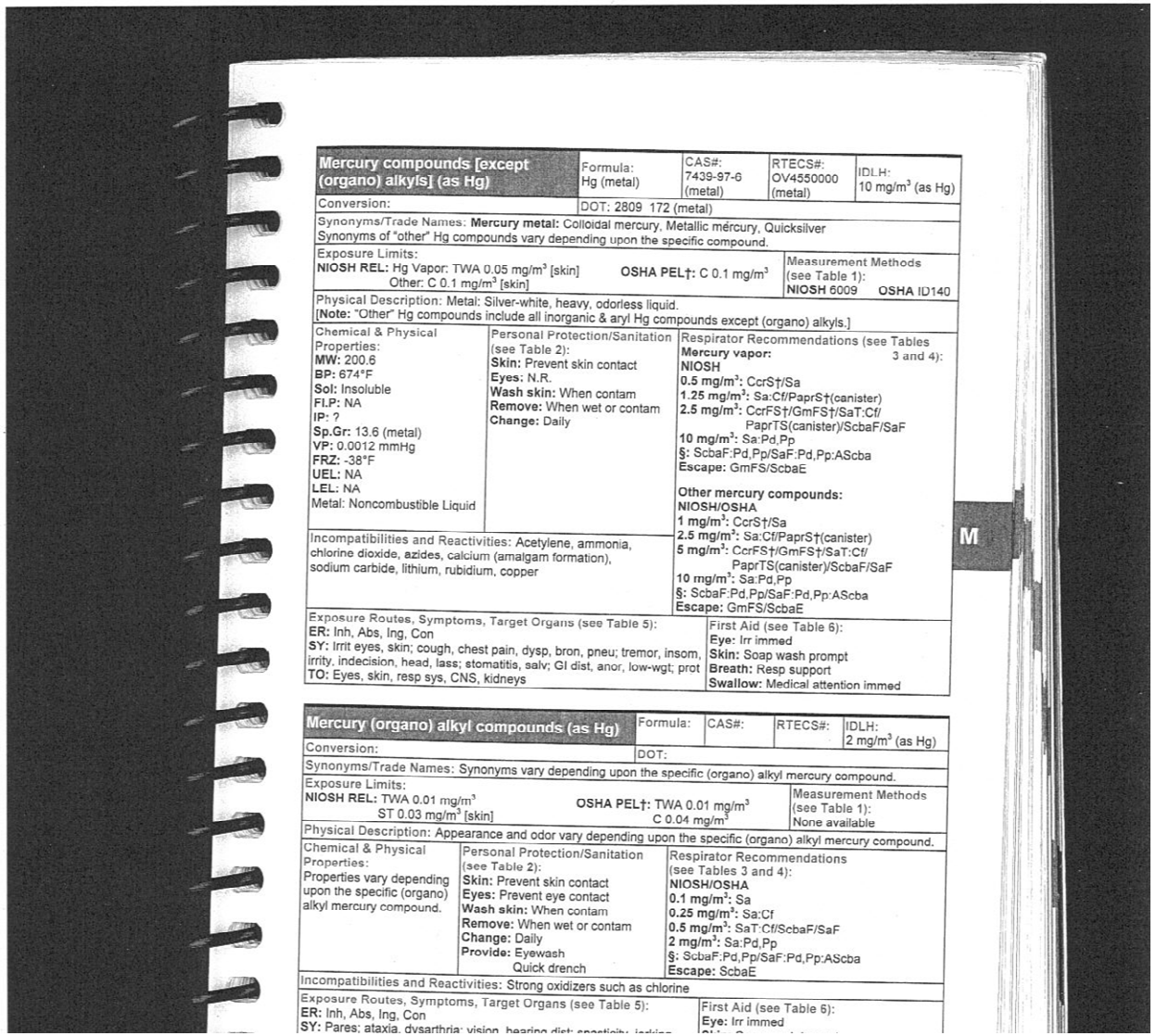
A seldom seen view of mercury

The Ohio EPA

and Bowling Green State University

Make it possible to see the shadow of mercury vapor.

NIOSH for Mercury



Mercury compounds [except (organo) alkyls] (as Hg) | Formula: Hg (metal) | CAS#: 7439-97-6 (metal) | RTECS#: OV4550000 (metal) | IDLH: 10 mg/m³ (as Hg)

Conversion: DOT: 2809 172 (metal)

Synonyms/Trade Names: **Mercury metal:** Colloidal mercury, Metallic mercury, Quicksilver
Synonyms of "other" Hg compounds vary depending upon the specific compound.

Exposure Limits:
NIOSH REL: Hg Vapor: TWA 0.05 mg/m³ [skin]
Other: C 0.1 mg/m³ [skin]
OSHA PEL†: C 0.1 mg/m³
Measurement Methods (see Table 1):
NIOSH 6009 **OSHA** ID140

Physical Description: Metal: Silver-white, heavy, odorless liquid.
[**Note:** "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.]

Chemical & Physical Properties:
MW: 200.6
BP: 674°F
Sol: Insoluble
FI.P: NA
IP: ?
Sp.Gr: 13.6 (metal)
VP: 0.0012 mmHg
FRZ: -38°F
UEL: NA
LEL: NA
Metal: Noncombustible Liquid

Personal Protection/Sanitation (see Table 2):
Skin: Prevent skin contact
Eyes: N.R.
Wash skin: When contam
Remove: When wet or contam
Change: Daily

Respirator Recommendations (see Tables 3 and 4):
Mercury vapor:
NIOSH
0.5 mg/m³: CcrS†/Sa
1.25 mg/m³: Sa:Cf/PaprS†(canister)
2.5 mg/m³: CcrFS†/GmFS†/SaT:Cf/PaprTS(canister)/ScbaF/SaF
10 mg/m³: Sa:Pd,Pp
§: ScbaF:Pd,Pp/SaF:Pd,Pp:AScba
Escape: GmFS/ScbaE

Other mercury compounds:
NIOSH/OSHA
1 mg/m³: CcrS†/Sa
2.5 mg/m³: Sa:Cf/PaprS†(canister)
5 mg/m³: CcrFS†/GmFS†/SaT:Cf/PaprTS(canister)/ScbaF/SaF
10 mg/m³: Sa:Pd,Pp
§: ScbaF:Pd,Pp/SaF:Pd,Pp:AScba
Escape: GmFS/ScbaE

Incompatibilities and Reactivities: Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper

Exposure Routes, Symptoms, Target Organs (see Table 5):
ER: Inh, Abs, Ing, Con
SY: Irrit eyes, skin; cough, chest pain, dysp, bron, pneu; tremor, insom, irrity, indecision, head, lass; stomatitis, salv; GI dist, anor, low-wgt; prot
TO: Eyes, skin, resp sys, CNS, kidneys

First Aid (see Table 6):
Eye: Irr immed
Skin: Soap wash prompt
Breath: Resp support
Swallow: Medical attention immed

M

Mercury (organo) alkyl compounds (as Hg) | Formula: | CAS#: | RTECS#: | IDLH: 2 mg/m³ (as Hg)

Conversion: DOT:

Synonyms/Trade Names: Synonyms vary depending upon the specific (organo) alkyl mercury compound.

Exposure Limits:
NIOSH REL: TWA 0.01 mg/m³
ST 0.03 mg/m³ [skin]
OSHA PEL†: TWA 0.01 mg/m³
C 0.04 mg/m³
Measurement Methods (see Table 1):
None available

Physical Description: Appearance and odor vary depending upon the specific (organo) alkyl mercury compound.

Chemical & Physical Properties:
Properties vary depending upon the specific (organo) alkyl mercury compound.

Personal Protection/Sanitation (see Table 2):
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contam
Remove: When wet or contam
Change: Daily
Provide: Eyewash
Quick drench

Respirator Recommendations (see Tables 3 and 4):
NIOSH/OSHA
0.1 mg/m³: Sa
0.25 mg/m³: Sa:Cf
0.5 mg/m³: SaT:Cf/ScbaF/SaF
2 mg/m³: Sa:Pd,Pp
§: ScbaF:Pd,Pp/SaF:Pd,Pp:AScba
Escape: ScbaE

Incompatibilities and Reactivities: Strong oxidizers such as chlorine

Exposure Routes, Symptoms, Target Organs (see Table 5):
ER: Inh, Abs, Ing, Con
SY: Pares; ataxia, dysarthria; vision, hearing dist; spasticity, jerking

First Aid (see Table 6):
Eye: Irr immed

Physical and Chemical Properties

- **Appearance:** Silver-white, heavy, mobile, liquid metal.
- **Odor:** Odorless.
- **Solubility:** Insoluble in water.
- **Density:** 13.55
- **pH:** No information found
- **Evaporation Rate (BuAc=1):** 4
- **% 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)

Hg

13.5
times
denser
than
water!

Metallic Mercury amounts are usually expressed in grams, milligrams and pounds

Mercury Vapor amounts are usually expressed in micrograms (ug/m3) or (ng/m3)

Mercury is corrosive to gold and other metals

- Rings from a resident
  - Mercury from a thermostat spilled in the house (several weeks duration)
- Remove or protect your jewelry first

Mercury Impersonators

- Solder

Mercury Impersonators

- Ball bearings

Glitter from grout

Another metal that is liquid metal at room temperature…

- Galinstan
  - Mix of ***gal***lium, ***in***dium, and ***stan***num (tin)
  - “Geratherm®” is one brand
- Smears on glass
  - No beads
  - Darkens when exposed to air

It's the vapors

- The mercury you can easily see may **not** give off as much vapor

as the mercury you can't see.

Biological source of mercury

- Methylmercury
  - Mercury converted to methylmercury by microorganisms
- Sport-caught and commercial fish

Engstrom 2007 PNAS 104:16394-5.

www.michigan.gov/fishandgameadvisory

Paint, synthetic flooring, kid’s games and shoes, fishing lures, skin creams, antique clocks mirrors clock weights and much, much more...

Calomel aka mercurous chloride

- Skin whitening and conditioning cream

Amounts in Commonly Broken Hg Containers

Household Fever Thermometers	0.5 - 1.5 grams
Honeywell thermostat (1 switch)	3 grams
Laboratory Thermometers	3 g - 4 grams
Sphygmomanometers	110 - 300 grams

(Sfig - moe – man –ometer) ~ 1 year

Mercury Facts

Estimating Amounts:

1 gram ≅ pencil eraser sized bead
(no mistakes)

1lb.= 454 grams ≅ A 35mm film canister, or two dairy creamer containers of liquid.

Consider the container and the fullness!

Common sources of elemental mercury

- Switches
  - Thermostats
  - Ovens
  - Furnaces (mercury flame sensor and fan limit control switches)
  - Gas hot water heaters
- Medical devices
  - Thermometers
  - Blood pressure units (sphygmomanometer)
- Fluorescent bulbs
  - Tube
  - CFL
- Random size containers of free-flowing mercury

Mercury switches and pumps…

- Tilt, pressure, or float switches (possibly others)
- Some pumps

Mercury flame sensors

- Mercury expands when heated

Mercury-containing wall mounted blood pressure unit (sphygmomanometer)

- 100 to 300 grams of mercury (0.2 to 0.6 lbs)
- Jan 2009 law – medical facilities
  - One for calibration purposes only

Fluorescent Tubes

- Mercury content Hg
  - 1.7 mg to 8 mg (0.0017 to 0.008 grams)
  - Green ends – lower mercury
  - As high as 40 mg
- New bulbs
  - Most mercury is a vapor
- Burnt out bulbs
  - Most mercury is bound to phosphor powder

Compact Fluorescent Lightbulbs (CFLs)

- 4 mg (0.004 g) of mercury Hg
- New vs. burnt out
- Been in the news recently
  - 100 times less mercury than a fever thermometer
- Cleanup guidance

www.michigan.gov/mercury

Hydrometer

Sling Hygrometer

- Barometer

manometer

The Best Defense…

Education

- Videos for schools available
- Piggyback on mercury media coverage
- Health Fairs
- Visiting nurses
- Clinic and other reception area counters

Prevention

Collection and Disposal

- Mercury thermometers
  - Exchanges for digitals
- Device replacement
  - Thermostats, sphygmomanometers, others…
- Liquid mercury
  - Household hazardous waste center
- Contaminated items
  - Disassembled & place in normal waste collection

Questions?

Comments?