MERCURY

Silver-white, odorless, liquid metal at room temperature

Mercury

Mercury is a potent neurotoxin that can affect the brain, spinal cord, kidneys and liver.

According to the U.S. Centers for Disease Control and Prevention, up to one in 10 women in the U.S. already carry enough mercury in their blood to pose a threat of neurological damage to the fetus.

The U.S. EPA ranks the health care sector as the fourth largest source of mercury air emissions due to their contribution to medical waste incinerators.

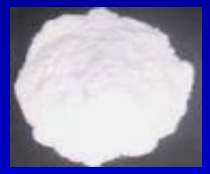
Mercury

Mercury is a naturally occurring heavy metal. At ambient temperature and pressure, mercury is a silvery-white liquid that readily vaporizes and may stay in the atmosphere for up to a year. When released to the air, mercury is transported by air currents, ultimately accumulating in marine and lake bottom sediments. In these environments, bacteria can transform inorganic mercury compounds into an organic form – methyl mercury – which is known to accumulate in fish tissue and subsequently affect humans through the food chain

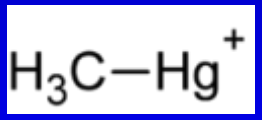
Chemical Forms of Mercury

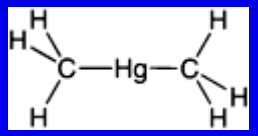
- Elemental
  - Liquid Metal

- Inorganic Salts
  - Mercuric Chloride



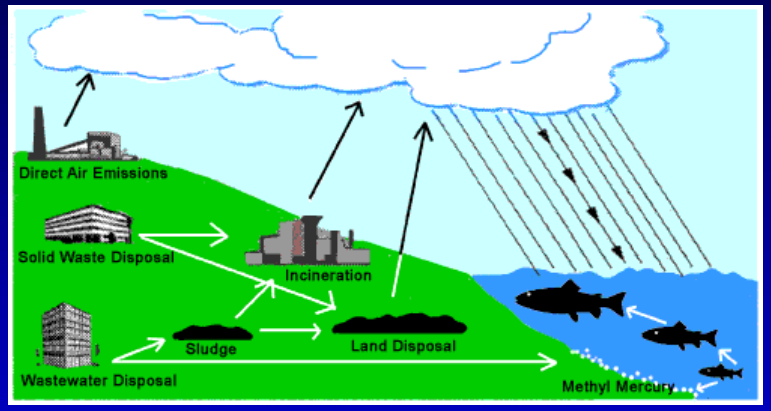
- Organic
  - Methyl, Ethyl, Dimethyl
  - Phenyl Organic Groups





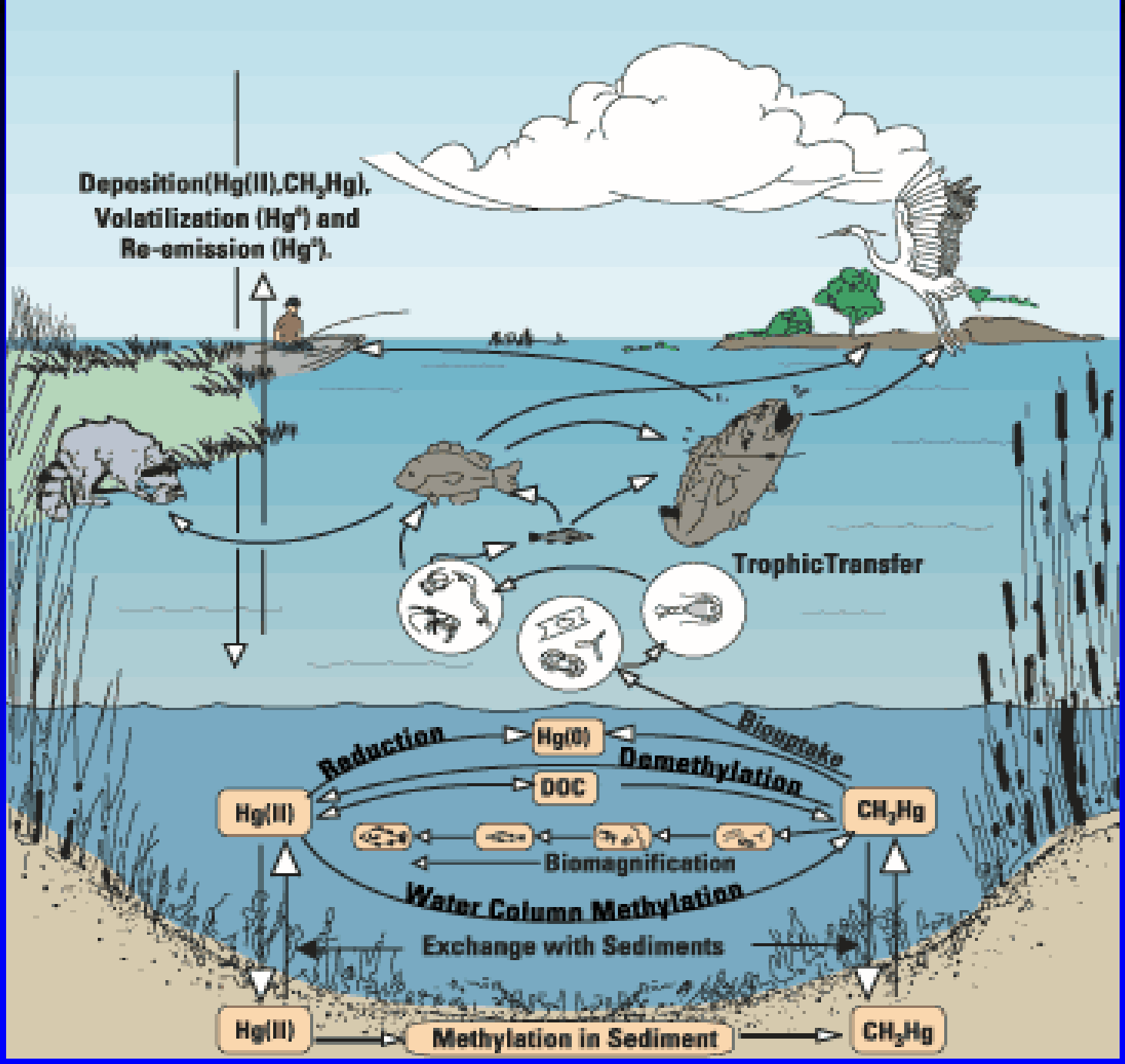
Mercury in the Environment

Mercury Cycle



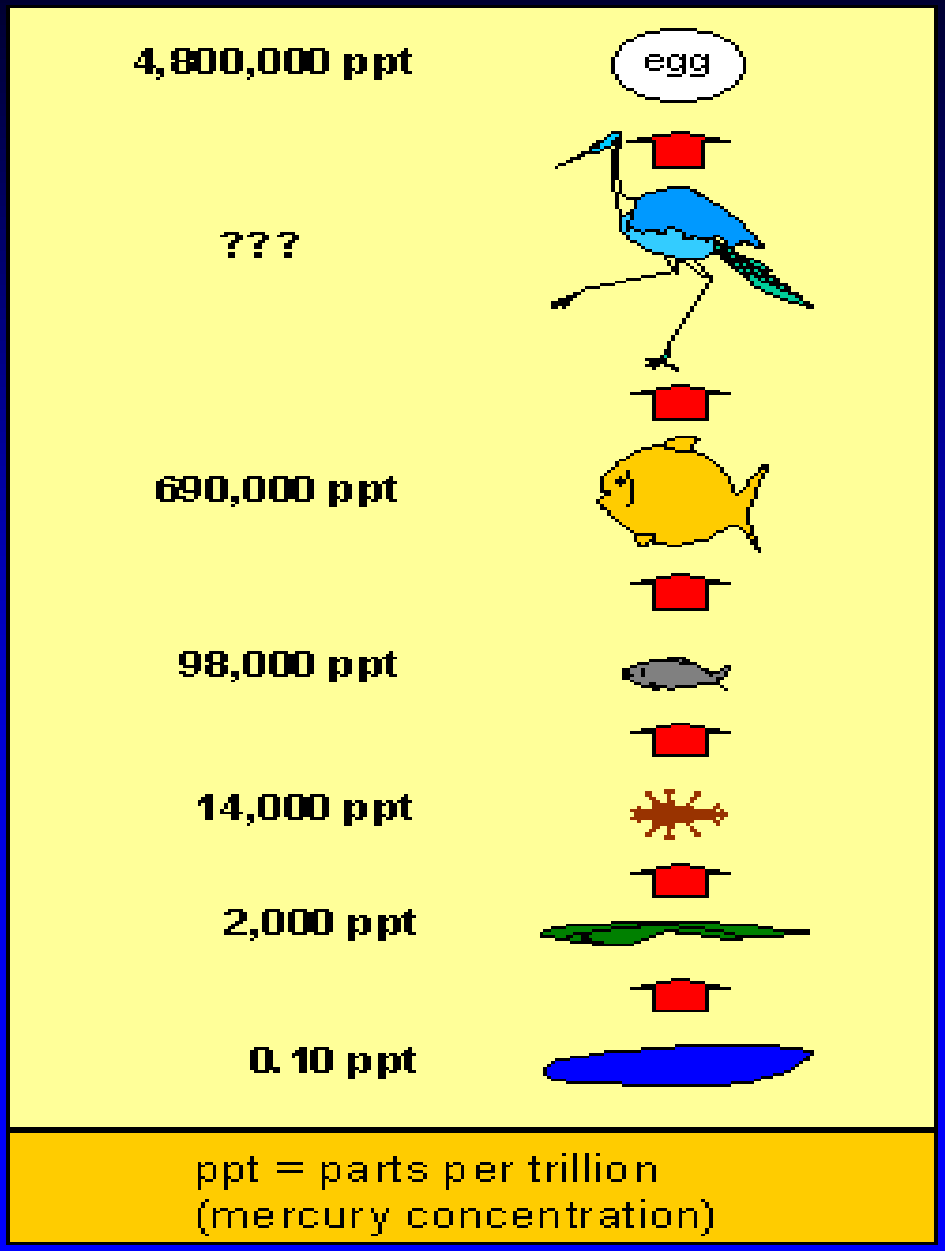
Source: New York State Department of Environmental Conservation

- Emitted from human activities & natural sources
- Circulates in the atmosphere from 6 months to 1½ years
- Deposited back into land or bodies of water
- Converted into insoluble forms, settling into sediment
- Converted by bacteria into methyl mercury and enters the food chain
- Released back into the atmosphere by volatilization



Source: United States Geological Survey

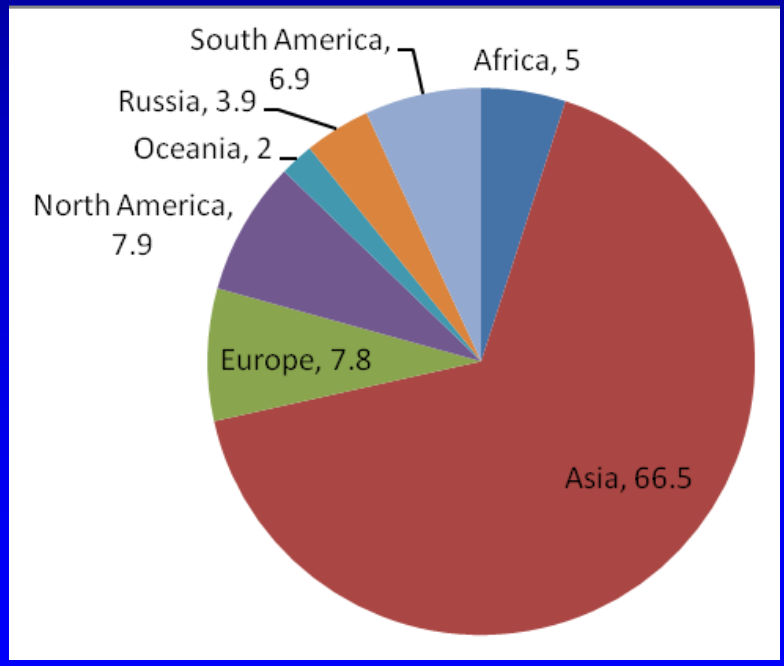
Biomagnification of Mercury



Source: South Florida Restoration Science Forum

Mercury Emissions & Sources from Human Activity

- The global atmospheric emissions of mercury is estimated at 1930 tonnes from human activities in 2005
- Compared to pre-industrial times, levels of mercury in the environment have significantly increased
- The major sources include: coal combustion, gold mining, metal production, waste incineration, and product-use (e.g., thermometers, pressure gauges, etc.)



Global mercury emissions to air from human activities in 2005 by

Health Care Products Containing Mercury and Their Alternatives

- **Product**
  - Hg batteries
  - Esophageal devices, Cantor & Miller-Abbott tubes
  - Hg thermometers
  - Hg-based blood pressure monitoring devices
  - Lamps & lighting devices
  - Hg switches
  - Hg dental amalgams

- **Alternatives**
  - Lithium, zinc air, alkaline
  - Tungsten-filled dilators, products w/ tungsten tubing Anderson AN-20
  - Digital, alcohol, galinstan
  - Aneroid, electronic (oscillometric)
  - Non-Hg lamps, LEDs
  - Non-Hg switches
  - Gold, ceramic, porcelain

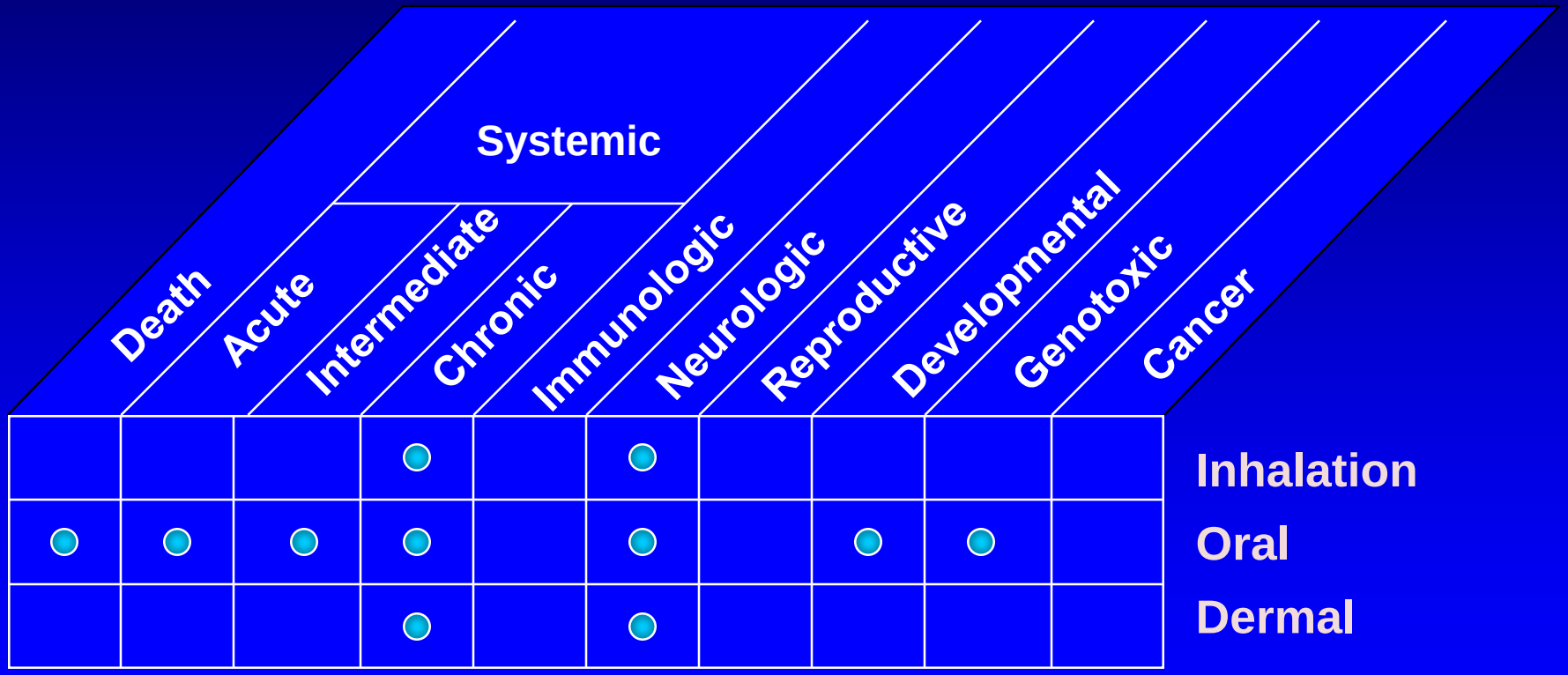
Health Effects of Mercury (Hg)

- Depend on the form of mercury, type of exposure (acute or chronic), route of exposure, dose

EXAMPLES:

- Acute exposure to high levels of elemental Hg
  - tremors, slowed motor nerve functions, memory loss
- Acute inhalation of high amounts of elemental Hg
  - chest pains, acute renal failure, shortness of breath

Summary of Health Effects of Methyl Mercury on Humans



Existing Studies (ATSDR 1998)

WORLD HEALTH ORGANIZATION

WHO Policy on Mercury in Health Care

Short Term: Develop and implement plans to reduce the use of mercury equipment and replace with mercury free alternatives. Address mercury clean up, waste handling and storage procedures.

Medium Term: Increase efforts to reduce use of unnecessary mercury equipment .

Long Term: Support a ban of mercury containing devices and promote alternatives.

www.mercuryfreehealthcare.org www.noharm.org

Typical sphygmomanometer

Sphygmomanometer in patient room

Hidden sphyg stored in drawer in storage room

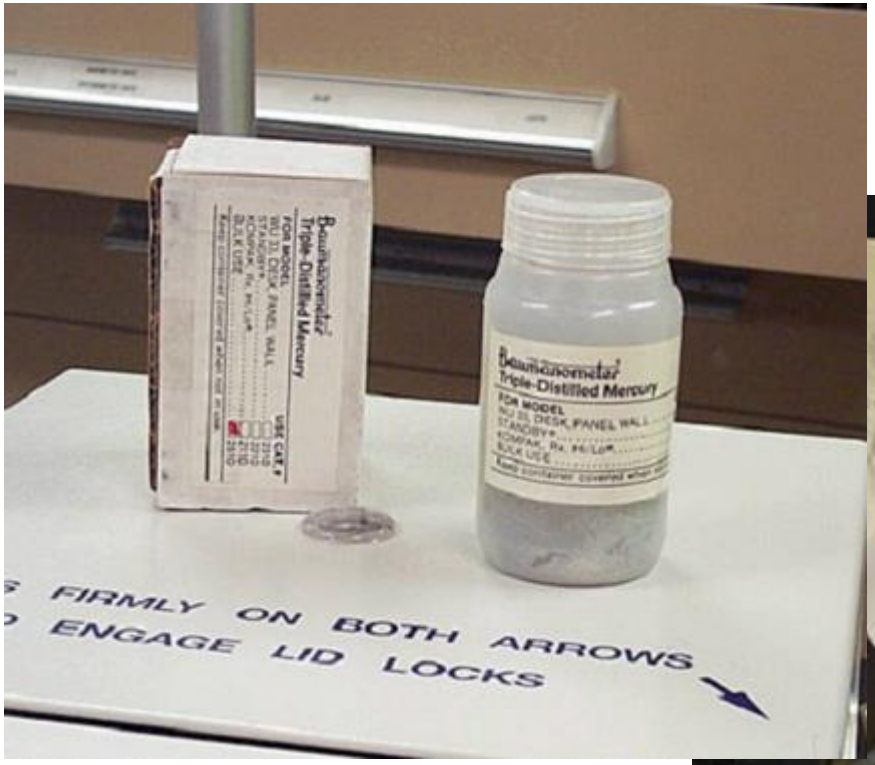
Aneroid Sphygmomanometers

Replacing mercury-containing sphygs with aneroid sphygs

Bulk Mercury

- Associated with Sphygmomanometers
- Kit in Engineering
- Bottles in Engineering
- Other

Bulk Hg used for sphyg maintenance



Bulk Hg for sphyg maintenance – one bottle of “new” Hg and one bottle of Hg waste

Sphyg service kit – Contained bottle of Hg – (see previous slide)

Thermometers

- Neonatal Nursery
- Laboratory
- Refrigerators
- Barometer with attached Thermometer

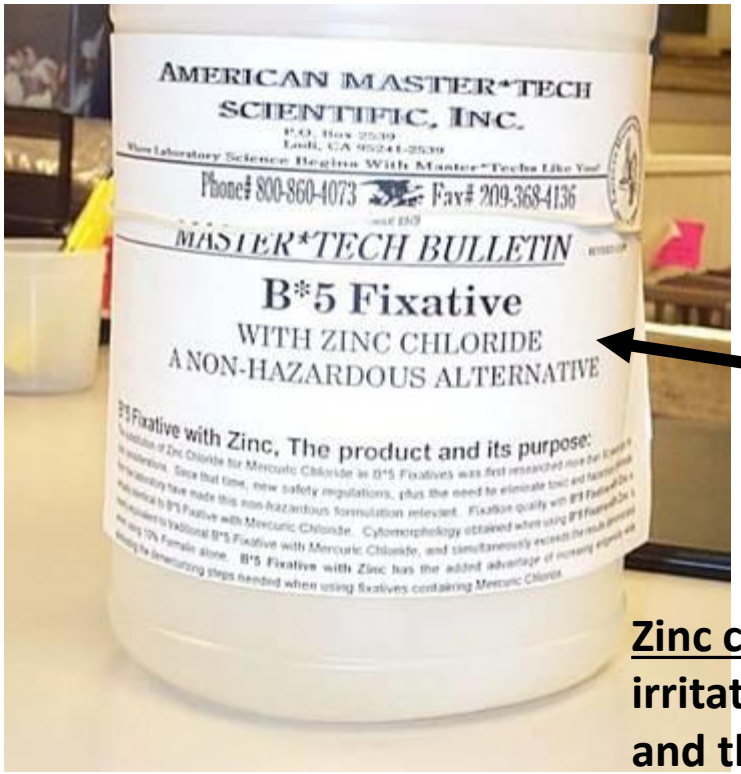
Laboratory thermometers

More Laboratory thermometers

NIST-traceable thermometer

Chemicals in the laboratory

Replace



With this

<u>Zinc chloride</u> can cause irritation of the nose and throat and conjunctivitis

Mercuric chloride is highly toxic

Which Chemical Waste is hazardous? How is it managed?
Liquid Mercury Waste

Elemental Mercury and Mercury compound solutions must be disposed in leak-proof containers, sealed tightly. Moreover, it should not be incinerated under any circumstance.

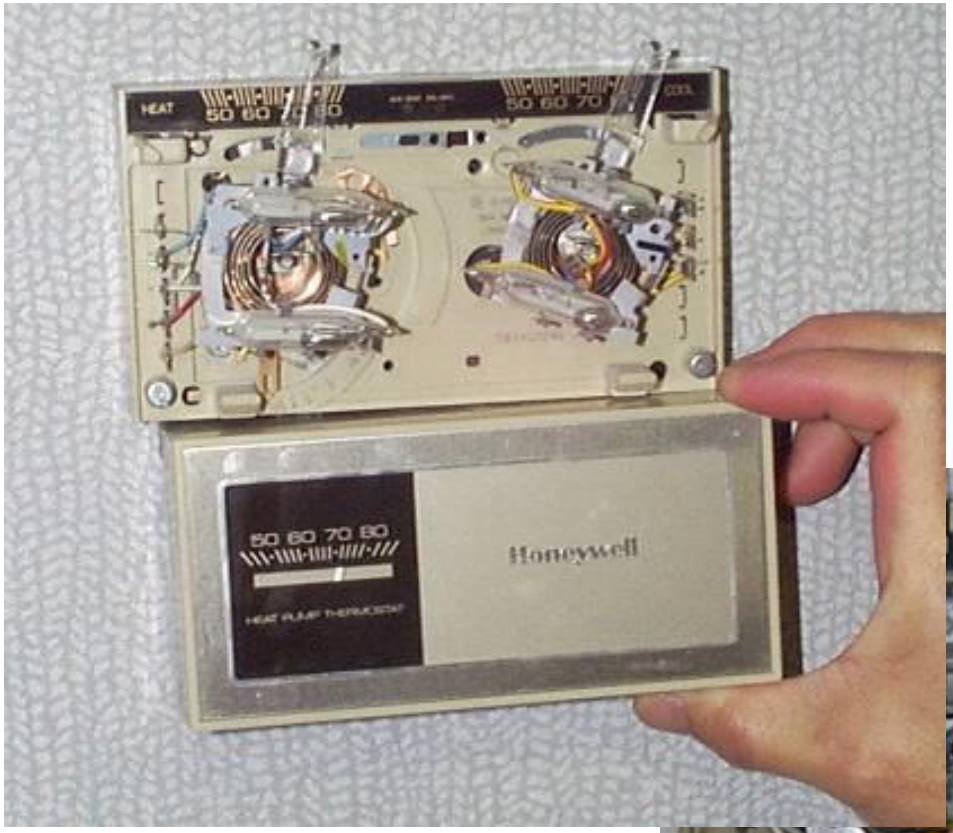
Solid Mercury Waste

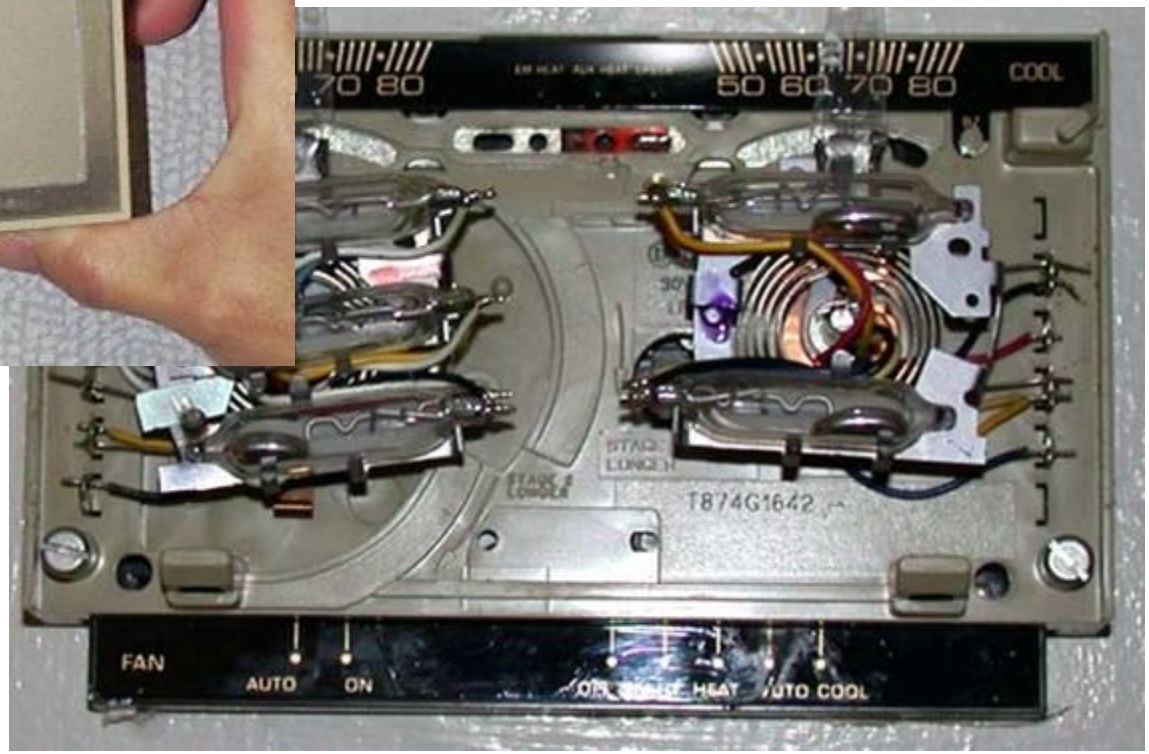
Solid Mercury waste including Mercury-contaminated gloves, contaminated towels and spill cleanup material should be double-bagged and tightly sealed before disposal. Moreover, it should not be incinerated under any circumstance.

Switches

- Vacuum system barostats
- Boiler Barostats
- Boiler water level switch
- Mercury Room Thermostat
- Sump pump switch
- X-ray tube

Thermostats containing mercury





Non-mercury thermostat

Fluorescent Lighting

- Fluorescent tubes
- Bilirubin lights

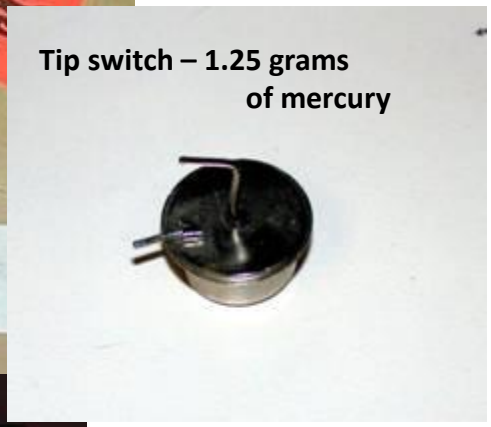
Broken Fluorescent Light Tubes

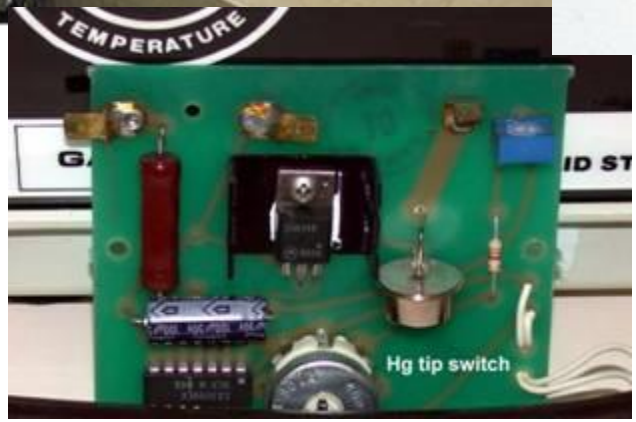
Broken fluorescent light tubes are hazardous waste. These broken tubes should be collected, double-bagged and tightly sealed. The bag should then be placed in a box/container and sealed for disposal.

Mercury-containing Thermometers, Thermostats, Switches

Wastes from Mercury-containing thermometers, thermostats and switches should be collected in a large container, zip-lock plastic bags or wide-mouthed jars with lids before disposal. Moreover, they should not be incinerated under any circumstance

Other devices





Mercury Spill - Who do you Contact?

Anyone who has questions regarding mercury or spill procedures should contact their Laboratory Supervisor, their own Supervisor, or the HSC Safety Committee.

Contain Spill

- Prevent the spread of mercury when cleaning up a mercury spill.
- Mercury beads can splash and roll around.
- Secure the area around the spill, so the mercury does not get "tracked" or "kicked" around.

Restrict Area

- Cease activities and keep the area restricted until the entire spill is cleaned up.

Mercury Vacuum

- One can use a special vacuum cleaner is available which is designed to pick up mercury droplets safely.

Location of Mercury Vacuum

- If there is no vacuum available for use do not try to use a shop vac or other device.

Temporary Control

- If a mercury vacuum is not readily available, cover the spill with sulfur or zinc powder as a temporary control measure.
- Cover from the perimeter of the spill toward the center. Do not walk through the spill or the sulfur or zinc powder.

Special Care

- Special attention must be taken in cleaning cracks and crevices where the mercury may have settled.

Specialty Wipes

- **All visible mercury beads are collected using the mercury vacuum followed by specialty wipes.**

Mercury Beads

- Mercury beads easily enter cracks and crevices.

Sulfur Impregnated Cloths

- Sulfur impregnated cloths may be used for a final wipe down of the area being cleaned

Mercury Waste

- Mercury waste and all waste materials contaminated with mercury must be labeled before disposal.

Disposal

- No mercury, including broken thermometers, may be disposed of in the normal trash or into the sewer system.

Air Monitoring

- Air monitoring should be used in conjunction with the mercury vacuum to ensure the complete removal of mercury and to assess spill cleanup personnel exposure.

SORB TECH

MERCURY MAGNET™

Product Specification Sheet

Mercury Magnet™ powder is the ideal solution for the proper decontamination and clean up of mercury spills. Engineered for a quick response, Mercury Magnet is environmentally friendly allowing for the treated mercury to be properly recycled.

In the event of a "spill", the fumes released by mercury can go undetected for long periods of time creating serious health hazards. In fact, mercury can be found in many household items such as; fluorescent bulbs (CFLs), non-electric thermostat switches, thermometers—even LCD screens.

The Mercury Magnet powder reacts with liquid mercury to form a solidified amalgam that not only brings the mercury vapor pressure below harmful levels, but also allows for easy pick up using a common magnet.

BENEFITS

- Effective decontamination and clean up of a mercury spill
- Reduces mercury vapors below harmful levels
- Powder reacts with liquid mercury to form a solidified amalgam
- Designed for quick response, clean-up and disposal
- Safety risks and environmental hazards minimized

FEATURES

- Proprietary blend of powders
- A complete kit that includes safety gear, a magnetic pick up tool and assorted clean-up and containment material
- The finest technology for treating and cleaning mercury spills

APPLICATIONS

The Mercury Magnet powder is safe to use at home and in the work environment—wherever the risk of an accidental mercury spill may occur. The Mercury Magnet spill kit contains all of the necessary clean up and personal safety gear you'll need in addition to the proprietary powder.

SORB TECH
A subsidiary of RST

Corporate Offices
P: 603.382.8481
F: 603.378.0816

Pennsylvania Offices
P: 570.848.4186
M: 570.371.8464

www.sorb-tech.com
info@sorb-tech.com
SORBTECH Mfg, Inc.

MM-101613

SORB TECH

CHEMOSET™

Product Specification Sheet

ChemoSet™ is a dry powder absorbent/solidifier that cementatiously **solidifies** chemicals such as those found in chemotherapy drugs. No special tools or equipment are required. The ChemoSet kit contains everything you need for a quick clean-up resulting in waste material that is safe for immediate disposal.

Simply shake the powder on the spill until it is dry in appearance. The final result is a dry semi-loose powder that is easy to handle, package, and dispose of—not in a messy gelled state that many competitive products offer.

BENEFITS

- Neutralizes and solidifies cytotoxic spills
- Designed for quick spill response
- Ideal for medical personnel or oncology practitioners
- Complies with OSHA standards
- Safety risks and environmental hazards minimized

FEATURES

- ChemoSet™ neutralizing cytotoxic solidifier powder
- Easy-grip, easy-pour bottle
- A complete kit that includes safety wear and clean-up equipment

OTHER

- ChemoSet is also available in bulk form

APPLICATIONS

A safe and effective method to neutralize, solidify, and dispose of hazardous cytotoxic spills.

As a convenient chemotherapy spill kit, ChemoSet is designed for a quick response to an accidental spill at home or in the hospital while administering chemotherapy treatment to patients. Ideal for doctors, nurses and oncology practitioners.

PROCEDURES TO BE FOLLOWED FOR SMALL CHEMICAL SPILLS

- Contain Spill.
- Notify all staff.
- Close all drains.
- Switch off all electrical equipments.
- Cordon off the area.
- Assist any person that has been exposed to Chemical spill.

PRECAUTIONARY MEASURES

- Put on all protective clothing, goggles and acid resistant gloves.
- Cover all wet spills with absorbent packs or with loose PP.
- Clean up all dry spill using the scoop.
- Try not to mix chemicals when scooping up. Ask Safety Officer for a list of incompatible chemicals.
- Place all dry chemicals in a sturdy plastic bag, tie with vinyl bag ties, and label if contents are known.

PRECAUTIONARY MEASURES

- Pick up all broken glass using tongs and put it into the broken glass containers supplied in every lab. Take note of all information on the Labels from broken containers, both safety information and toxicity.
- After the absorbent packs have absorbed 10-20x there own weight, they are saturated and need to be replaced by another absorbent pack.
- Put saturated absorbent packs into plastic bags for disposal.

SPILLS REQUIRING SPECIAL PROCEDURES

- **Acid Chlorides**

  Use saw dust or or dry sand.

  Avoid water and avoid sodium bicarbonate.

- **Alkali Metals (lithium, sodium, magnesium, potassium)**

  Smother with dry sand or cover with contents from a Class “D” fire extinguisher. Use of a Class “D” fire extinguisher is the preferred extinguishing method. Avoid contact with water.

SPILLS REQUIRING SPECIAL PROCEDURES

- **White or Yellow Phosphorus**

  Blanket with wet sand or wet absorbent.
- **Bromine**

  Neutralize spill with a 5% solution of sodium thiosulfate.

  Absorb with inert absorbent material.
- **Hydrofluoric Acid**

  Neutralize with soda ash or lime (or absorb spill with special HF spill pillow).

  Absorb with inert absorbent material.

HEPA Filters

Contaminated High Efficiency Particulate Air filters (HEPA filters) with chemicals in biological safety cabinets should be treated as a chemical waste. These contaminated filters should be disposed per to the manufacturer's recommendations. It is important that an appropriate eye and respiratory protection should be worn while performing this task.

Note that Beryllium containing materials, in any form, should not be incinerated or allowed for dispersal as dust or fume under any circumstances.

http://www.hsc.edu.kw/vpo/HSE/FAQ.aspx

Ethidium bromide

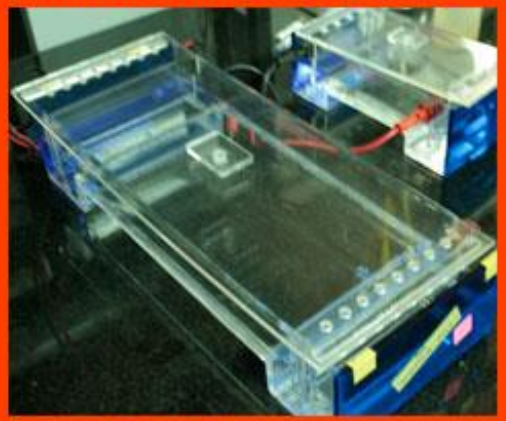
Ethidium Bromide (EtBr), commonly used in research laboratories as a stain for the visualization of nucleic acids in electrophoresis gels, is a toxic chemical and a potent mutagen. When used in nucleic acid staining, ethidium bromide fluoresces a red-orange to pink color under ultraviolet light and with increased fluorescence when bound to double-stranded DNA. While it is not specifically regulated as a hazardous waste, the mutagenic properties may present health hazards and disposal concerns if it is not managed properly in the laboratory.

Preparing Agarose solution

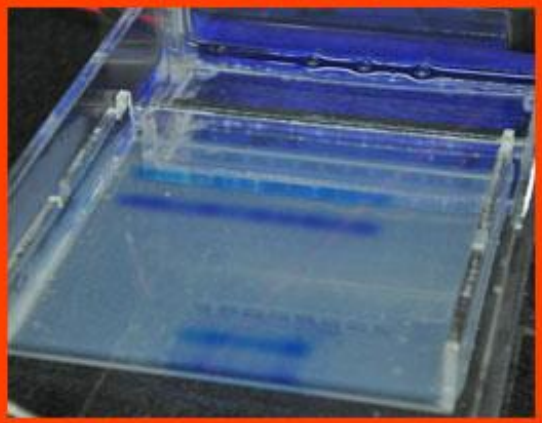
Ethidium Bromide + Agarose soln.

Setting the gel

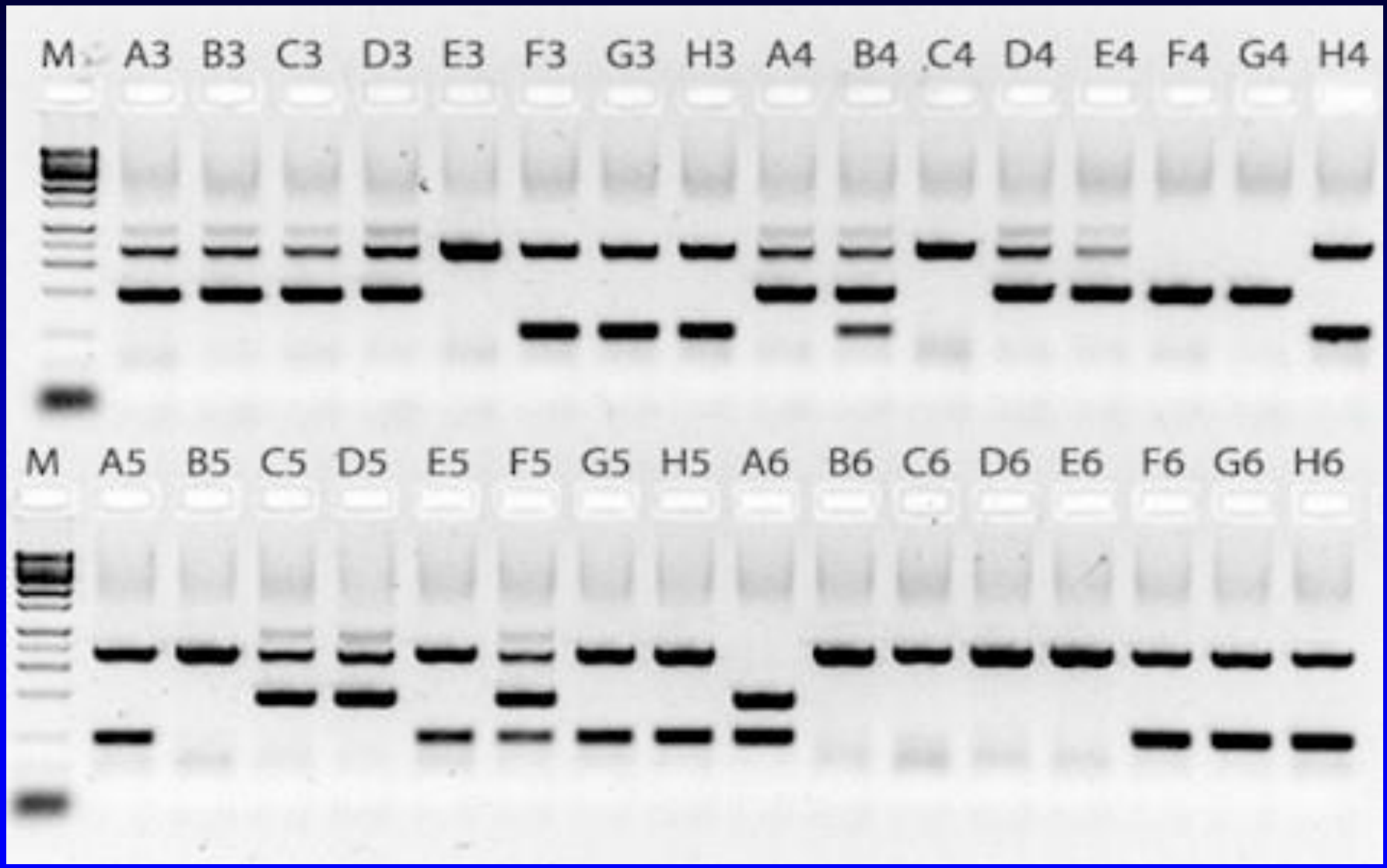
Gel (after half an hour)



The Equpiment



The Gel, after electrophoresing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M A5 B5 C5 D5 E5 F5 G5 H5 A6 B6 C6 D6 E6 F6 G6 H6


molecular
probes | labeling & detection
by life technologies
S33102
Lot: 1135054
400 µL
SYBR® Safe nucleic acid gel stain
Store at: 25° 15°
10,000X concentrate in DMSO
Desiccate, Protect from light
Made in USA
invitrogen

SYBR SAFE

Ethidium Bromide

Aqueous solutions containing > 10 µg/mL Ethidium Bromide should be first filtered or deactivated before disposal in special containers using:

Charcoal Filtration (Funnel Kit, Green Bag)
Chemical Neutralization (Armor Method, Lunn and Sansone Method, Quillardet and Hoffnung Method)

Dried gels containing Ethidium Bromide or any contaminated solid waste e.g. gloves, microfuge tubes, etc should be disposed in hazardous waste containers.

Note that personal protection e.g. eye protection, respiratory protection, Nitrile gloves ONLY, lab coat must be worn all the time when handling Ethidium Bromide.

Silica Gel, Molecular Sieves and Desiccant

Used silica gel, molecular sieves and desiccants that are contaminated with solvents or other hazardous chemicals must be disposed as hazardous waste. They should be first placed in brown hazardous bags then in a container. The container should be disposed when it is ¾ full.

Note that only unused silica gel, molecular sieves or desiccants that have not been in contact with hazardous chemicals may be disposed of in the regular trash within a sealed container.

Liquids

Fisher Scientific, Schleicher and Schuell, or VWR.

Ethidium Bromide Destaining Tea Bags