Mercury Technology Bulletin Series: 008

Treatment of Mercury Sphygmomanometers

Background

Requirement of the Minamata Convention on Mercury

Article 4 of the Minamata Convention requires the phase out of mercury added product including sphygmomanometers (SMMs) containing mercury by 2020.

Mercury contained in these devices needs to be recovered to the extent possible, in order to prevent contamination of the environment from improper handling of these products. However, mercury is a chemical element, and unlike other organic pollutants, cannot be treated easily with conventional treatment measures.

Furthermore, Article 11 of the Convention requires each Party to take appropriate measures so that mercury waste is managed in an environmentally sound manner. SMMs contain about 50 grams of mercury. Hence, mercury should be extracted from these devices and treated/disposed in an environmentally sound manner.

Sphygmomanometers with mercury

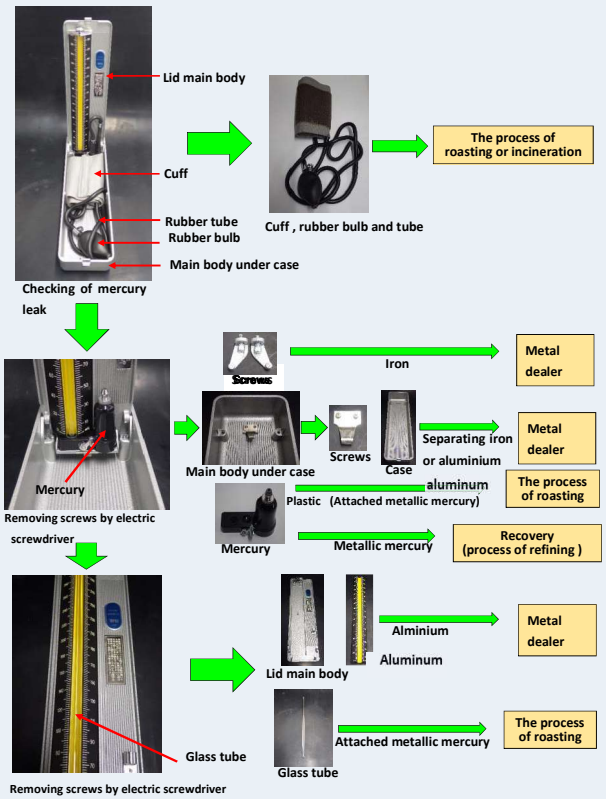
Overview of the Technology

In addition to mercury, SMMs contain various components made from glass, iron, aluminum and rubber.

The treatment process of SMMs starts with the segregation of the various components. The components that are not in contact with mercury are to be recycled. Mercury and components that are in contact with mercury undergo thermal treatment or recovery (as appropriate).

SMMs brought into the treatment facility are first checked for leakages of mercury. Bulbs, tubes and cuffs made from rubber which are manually removable are dismantled and go through a roasting process (600^{0}C to 8000C). Components not removable easily are accessed by removing the screws using electric screwdrivers and removing the outer case. The screws (iron) and the case (after segregating iron and aluminum components) are sent to metal dealers for recycling. Plastic components that have mercury attached are sent for roasting while the metallic mercury is routed to the recovery (refining) process.

Dismantling of the mercury tank itself is carried out inside a fume hood. The metallic mercury is collected in a bottle (iron) at the bottom of the fume hood. As before, segregated aluminum is to be recycled whereas glass tube is to be thermally treated by roasting.



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Advantages/Strengths

High recovery rate of mercury

A combination of manual dismantling and roasting ensures that the recovery rate of mercury is very high. On average, about 50g of mercury is recovered from one sphygmomanometer (SMM).

Safe and environmentally friendly method

Combination of fumed hood and sound care during dismantling ensures that no leakage of mercury occurs. The dismantling facility is closed off from other areas to prevent accidental leaking of mercury vapor to other areas. Exhaust air from the work area , before venting, is passed through a mercury adsorption tower where mercury vapor is adsorbed. Any material that comes in contact with mercury is sent for roasting whereby the mercury is vaporized and collected. Workers use safety gears while dismantling ensuring that the process is safe and environmentally friendly.

Dismantling process

Photo provided by Nomura Kohsan Co., Ltd.

Recycling of components

One advantage of manual segregation is that in addition to recovery of mercury, other components of the devices like iron and aluminum can be separated and recycled. This makes it possible to recycle other valuable resources.

Applicability

In many countries, phase out of mercury containing medical measuring devices is being promoted through their health ministries. However, there is a lack of institutional framework to treat these devices once they become waste.

Hence, these devices end up being stored in containers inside interim storage facilities located within the hospital premises until an adequate treatment/disposal method becomes available. Japan has a lot of experience and know how on safe methods of handling of mercury containing medical measuring devices without breakage. Further, Japan also has established a scheme to collect thermometers and SMMs from households and hospitals which can be of reference to other countries.

Further Reading

UNIDO, Nomura Kohsan's mercury waste management technology
(http://www.unido.or.jp/en/technology_db/1716/)

MOEJ, Guidelines for Separation and Collection of Mercury Containing Waste discharged from Households (Japanese only)
(http://www.env.go.jp/recycle/waste/mercury-disposal/h2712_guide1.pdf)

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