Mercury Spills

Posted by Anonymous on Wed, 2015-03-11 15:06

Mercury Spills: We have a small amount of mercury in a thick-walled test tube, which only comes out once a year and is handled by the teacher. I do not have a spill kit for this. I was wondering where do I buy one, or can I make one up? Also, what would be the procedure in the event of a mercury spill. I know evacuation would be a must, but that is all I know. I have also been thinking about placing this glass test tube in an appropriate plastic bottle to avoid a spill.

Any recommendations would be appreciated.

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Laboratory Technicians

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Submitted by sat on 23 March 2015

Answer reviewed 27 February 2023

Mercury is a fascinating element and observation of its properties is a worthwhile experience for students. However, mercury is classified as a Schedule 7 Dangerous poison[1] and is an extremely toxic substance. Therefore, it is important to minimise any risks involved in its storage and handling.

Mercury Hazards

The main route of exposure to mercury is by inhalation of the vapour. Mercury vapour is easily absorbed via the lungs into the bloodstream and even low-level chronic exposure to mercury vapour can cause damage to organs and the nervous system. Children are particularly vulnerable to the effects of mercury as their nervous system is not yet fully developed.

Mercury storage

NB: Important: check with your local state Department of Health if a permit is required to store and/or purchase Mercury metal as it is Schedule 7 Dangerous poison.[1]

Science ASSIST recommends that only a small amount of mercury be stored in a school and that this only be used for demonstration purposes. A sample of 25 mL or less should be sufficient for demonstrating the properties of mercury. The sample should be kept in a tightly sealed glass vessel which has a flat base. The glass vessel should be stored within a second container, in case the first vessel fails. A polycarbonate bottle with a screw cap lid would be suitable as a secondary container as polycarbonate is strong, non-reactive and transparent so as to allow observation of the mercury.

The mercury should not be removed from the sealed glass vessel and every effort should be made to prevent inappropriate use of the mercury sample.

To transfer a sample to a more suitable vessel, PPE (latex or nitrile gloves, safety glasses or goggles, closed shoes, lab coat) should be worn and the procedure conducted in a spill tray in a running fume cupboard. Ensure that the workspace is clear and uncluttered and that both vessels are stable (the test tube can be placed in a larger plastic beaker or. Carefully transfer the mercury using a pipette (e.g. a disposable plastic pipette) into the new vessel. After all the mercury has been transferred, and the new vessel sealed tightly, the original container and pipette and any other contaminated materials should be double bagged and labelled ‘DANGER: Elemental Mercury Waste’ with appropriate ADG corrosive and toxic class diamonds and stored for collection.

Mercury Spill Kit

Yes, we recommend that you have mercury spill provisions available in the unlikely event of a spill of your small quantity. We recommend that you have the following two inexpensive clean-up options in place, which are readily available to Australian schools.

- Mercury Spill Kit. This comprises a plastic storage jar with a cap that has a collecting sponge to collect the mercury globules. When the cap is screwed back on to the container, it compresses the sponge and deposits the globules in the storage container. The cap and sponge are then available to collect further globules. The mercury waste can then be stored for collection by a licensed chemical waste contractor. This would be the best response in the event of a small spill such as a broken thermometer. The kit is a Bel Art product and is available from Bel Art and other reputable suppliers. https://www.belart.com/mercury-collector.html
- One of the following.
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Mercury decontaminant powder available from chemical suppliers. These contain substances such as sulphur or zinc, which react with the mercury to form less volatile compounds. A lime-sulphur mixture is listed in the Chem-Supply chemical range and is available from the Chem-Supply retail companies across Australia. https://www.chemsupply.com.au/mt056-500g

- Powdered sulfur

Sprinkling of these powders has the effect of coating the surface of the mercury and reducing the generation of mercury vapours—which constitutes the health hazard—until the spill can be properly collected. They would be used for larger spills, or where the mercury has spilt into cracks or crevices or onto a porous surface for which the Spill Kit sponge is not fully effective.

Sulphur-containing powders allow easier visualisation of the mercury drops due to the reaction of mercury with sulphur to form brown mercury (II) sulphide. The reaction with sulphur is slow, and therefore the powder should be left to react for 24 hours. Care should be taken to avoid inhalation of powdered sulphur as it can cause irritation of the eyes, nose and throat.

It is important to have on hand the following PPE and clean up tools:

- PPE: nitrile gloves, safety glasses or goggles, p2 face mask
- waste containers e.g. heavy walled polyethylene bottle with a screwcap lid and/or plastic zip-lock bags
- a second container large enough to accommodate the waste container(s)
- plastic disposable Pasteur pipette or syringe (without the needle)
- adhesive tape
- paper towel
- metal tongs
- flashlight
- rigid cardboard, such as index cards

Mercury spill response procedure (up to 25 mL)

1. **Evacuate the area and restrict access to personnel who are involved in the clean up.**
2. **Ensure that no one walks through the spill site, as this could spread the mercury to other areas.**
3. **Turn off any air conditioning or heating systems. Close doors and windows to internal areas.**
4. **Open doors and windows to the outside. Use fans to direct air from the spill site to the outside.**
5. **Wear PPE: gloves, safety glasses or goggles, p2 face mask, closed shoes.**
6. **Use metal tongs to pick up any broken glass and place this in the waste container.**
7. **Use the index card or similar to sweep and combine the drops of mercury. Roll the mercury onto a piece of paper and place in the waste container.**
8. **Collect small drops with a disposable Pasteur pipette or syringe and squeeze the collected mercury onto a damp paper towel or transfer directly to the waste container.**
9. **Use the flashlight at a low angle to detect any remaining mercury droplets.**
10. **Collect any fine mercury droplets by blotting the area with adhesive tape.**
11. **Sprinkle fine sulfur or mercury decontaminant powder over the area, particularly where the mercury has spilt into cracks or crevices. Allow 30 mins for the powder to react and collect the residues, again using an index or similar card or plastic dustpan. (do not leave it longer as the any excess sulfur will oxidize into harmful sulfur dioxide)**
12. **Place the waste container within the second container and seal tightly to prevent the escape of mercury vapour. Seal the container in a plastic bag and label this as 'DANGER: Elemental Mercury Waste' and dispose of via a licensed chemical waste contractor.**

13. All equipment and materials used to clean up a mercury spill should be regarded as hazardous waste and disposed of via a licensed chemical waste contractor. Do not dispose of mercury waste or contaminated materials in the general rubbish.
14. **Where the mercury has contaminated porous materials such as clothes or carpet, remove the contaminated material and double bag. Mark as 'DANGER: Elemental Mercury Waste' and dispose of via a licensed chemical waste contractor.**
15. **Continue to ventilate the spill area to the outside for at least 48 hours.**

These measures should be effective for most mercury spills of up to 25 mL. If a larger spill occurs or if the spill is more complex, for example, if the spill site is inaccessible or includes porous materials which cannot easily be decontaminated, then professional assistance should be sought.

Sources of mercury

- hand held mercury thermometer
- clinical thermometer
- fluorescent light globe
- sphygmomanometer
- barometer

What not to do

- **Do not use a domestic vacuum cleaner to vacuum up mercury.** This will blow mercury droplets into the air and permanently contaminate the vacuum cleaner.
- **Never use a brush or broom to sweep up mercury.** This will fragment the mercury into small drops which are difficult to see and which can vaporise more easily.
- **Do not dispose of mercury waste or contaminated materials in the general rubbish.**
- **Do not dispose of mercury down the drain.** Mercury is toxic to aquatic life and also, if disposed of in this way, would likely contaminate the sink area and continue to emit vapours.

References

[1]Australian Government Department of Health and Aged Care. Therapeutic Goods Administration. (2017, November 28). *Australian State & Territory regulatory controls on Schedule 7 poisons.* Retrieved from Australian Government Department of Health and Aged Care. Therapeutic Goods Administration: https://www.tga.gov.au/how-we-regulate/ingredients-and-scheduling-medici... (Note this contains information for each state and territory)

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Thanks for that, very clear guidelines for us to follow.
