Welcome to the Wonderful World of Waste

and the School Laboratory

Part III

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This part will look at some "special problem" chemicals.

Mercury and Mercury Compounds

Elemental mercury, as commonly encountered in thermometers, barometers, manometers and switches, has some properties that cause consternation to the laboratory user. It is very heavy, with a density of 13.59. So, 1 litre of mercury will weigh 13.59 kg. 500 ml will weigh over 6 kg. 1 litre of water weighs 1 kg. Countless times we have been asked to dispose of mercury that has been collected in a 500g coffee jar and is virtually full! As mercury is so heavy, when you drop some, it goes everywhere. Its property of forming amalgams with many metals can be used to assist cleaning up spills from inaccessible areas, but never let it contact any jewellery as it will almost instantly discolour gold, for example, turning it silvery.

The threshold limit value (TLV) for elemental mercury is quoted by the American Conference of Governmental Industrial Hygienists as 0.05mg per m^3. TLV is more relevant for exposure in a workplace over prolonged time and is not the same as a TLV-50, the toxic limit value. The TLV can also be thought of as the recommended maximum atmospheric concentration. Elemental mercury is said to be absorbed through the skin. Inorganic and organic mercury compounds are far more toxic and dangerous than elemental mercury, although exposure to any of them is to be avoided. Mercury salts really have no place in a school laboratory and such chemicals are on our banned chemicals list. Elemental mercury perhaps, it's up to you, but running a risk assessment on the use of elemental mercury, even if present in a thermometer, will result in a risk control easily addressed by substitution; hence the temptation to dispose of all the mercury apparatus in a laboratory including perfectly good thermometers. Mercury has a vapour pressure of 13 mg/m^3 which is about 200 times the TLV so fugitive free mercury in a room will soon start approaching the TLV concentration. However it depends on the size or volume of the room and will take some time to reach the TLV in large rooms.

PICTURE: Elemental mercury. Avoid using glass containers for storage!

How do we deal with mercury spills? The use of sulphur should now be old hat and any Safety Data Sheet still parrot fashioning the use of sulphur to deal with spills should be viewed with scorn and derision. Mercury and sulphur do have an affinity, but not as the elements. Soluble sulphide will precipitate soluble mercury ions, but if you have ever covered a mercury spill with powdered sulphur expecting the mercury to react, you will be disappointed. It is very slow, to the point of non-reactivity, and it is far better and more rapid to form a zinc amalgam with zinc granules (not zinc dust). The granules react quickly, and the liquid mercury disappears, forming a solid mercury-zinc amalgam which can be swept or vacuumed up with no mercury vapour. There are also some proprietary mercury absorbing materials available, but I have had little success discovering the chemical make-up of these. The bottom line is to prevent mercury vapour build up, so physically collect the majority of a spill using the sponge in the lid collectors, the split mercury spoon, or the Pasteur pipette and rubber teat or even a dust pan and small brush with final clean up using the zinc granules. The free mercury should be collected in a plastic bottle, not a coffee jar. Try to avoid the use of glass containers for mercury full stop.

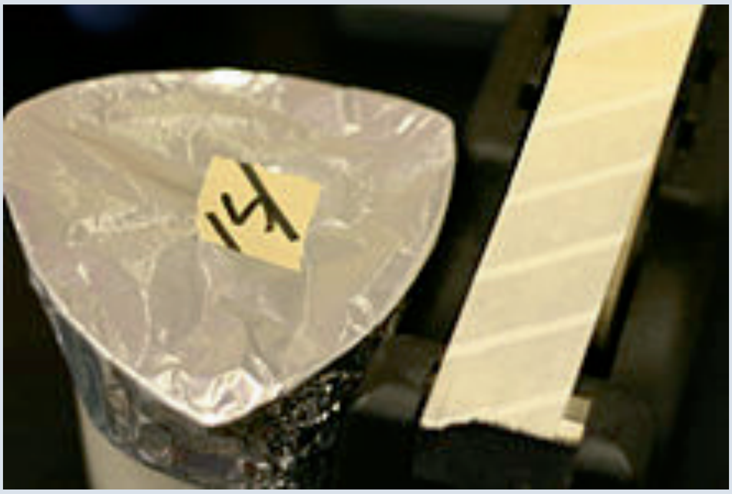
There is no need to panic and call for mass evacuations because you have spilled some mercury!

Medical and Infectious Wastes

These wastes include the yellow sharps container from the sick room which will contain bandages, band aids, blood stained tissues and the like, wastes from dissections, old petri dishes, swabs, scalpels, forceps and probes etc. The disposal of such wastes can go via sterilisation in an autoclave for the reusable instruments, offsite disposal by incineration for the band aids and tissues, chemical decontamination for chopping boards and instruments using a choice of disinfectants. Not all schools have an autoclave which utilises heat and pressure to kill bacteria and other microorganisms, although the use of pressure cookers is common. If you can, obtain some disclosing tape which, when subject to the correct temperature and pressure to kill the bugs, will form black stripes - it looks like masking tape when unused.

Animal parts that have been "worked on" such as eyes or hearts or rats can be wrapped up securely and disposed of in the school rubbish skip. I wouldn't recommend putting these into the autoclave or using liquid disinfectants. If required, storage should be in the freezer.

Your choices of disinfectant include ethanol or methylated spirits, but the ethanol concentration should not be greater than 70%. Solutions like pine o clean, which is a quaternary ammonium compound or "quat", are good and the old favourite, sodium hypochlorite, is most effective. Never acidify sodium hypochlorite as you may produce chlorine gas, which is most unpleasant. Have some of those disinfectant hand wipes available, or hand wash gel, and encourage frequent hand cleaning.



PICTURE: Autoclave, or disclosing, tape

Petri dishes which have been used to grow live microorganisms should be sterilised chemically with chlorine or in the autoclave. If using an autoclave, leave the lids on and secure them.

PICTURE: Yellow sharps container

The yellow sharps container can be used to store sterilised petri dishes with band aids; don't put them into the skip, they need to be incinerated.

We have run out of space for any more problem chemicals in this edition. Next edition we have a look at radioactives, explosives and highly reactives.

As always, if there is any topic you would like addressed, please contact me or the editor, Jessica Boys. Comments are always welcome, even if abusive!