

Welcome to the Wonderful World of Waste

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This quarters article looks at spills and mishaps in the school laboratory. I was prompted due to a recent small collection from a school which had experienced a chemical spill (formalin solution) and they had called the Fire Brigade. There was no fire involved . Apparently there were a number of their large vehicles and associated crew in the street for a spill comprising about 5 litres. A similar incident years ago from the same suburb involved a dropped vial of bromine. Again the lab technician panicked when confronted by the brown swirling fumes of bromine and called the MFB in. We came in to collect the result of their clean up which consisted of a 5 mL broken glass vial wrapped nicely in a large plastic bag contained within a 240 litre orange recovery drum. Some may say overkill, some may not say this at all. In both incidents the MFB did not remove the spilled items , they only attempted to make safe by containing the chemical involved.

Lessons to be learnt from these two incidents and some questions asked and few comments made would include the following ,in no particular order:

-the MFB are not really geared for small chemical spills especially in a school lab. All their emergency vehicles are large fully equipped Hazmat trucks and they are ready for anything . Sometime there is a cost involved and it will be brutal.

-in both incidents the lab technician preferred to call in an outside body to deal with the spill when good laboratory management and practice would strongly suggest that a spill kit in the lab would have dealt with both spills in a jiffy.

-bromine is an evil looking brown fuming liquid and would look menacing if a vial was dropped at your feet and brown fumes started coming towards you. Five minutes after the spill no trace would exist as bromine turns from liquid to vapour very quickly and soon dissipates.

-formalin is a solution of formaldehyde in water and has a fairly obnoxious aroma -to my sensitive nose anyway. Its reputation as a potential human carcinogen lead to alternatives to be sought. Gluteraldehyde ($C_5H_8O_2$) was for a while suggested as an alternative solution for disinfection, preserving and fixing but apparently it is much more toxic than formaldehyde and is also a probable human carcinogen. In the school lab. formalin is what is probably used as the preservative for the sealed zoological specimens. (Ethanol also , sometimes both)

-one of your risk controls when using any dangerous good (both bromine and formaldehyde are class 8) is to have an effective spill control in place. This would come under the Administrative controls. Remember when going through your risk controls to start at the top with Elimination ,and proceed down the controls list in order ,finishing up with Personal Protection Equipment (ppe)

-when doing your risk assessment (which leads to the Risk Controls) we strongly suggest you make yourself familiar with all the chemicals you will be dealing with. The properties of both bromine (ie a brown corrosive volatile liquid) and formaldehyde would or should have prompted some extra thought given to the spill controls. Bromine spills are effectively treated using lime , (calcium hydroxide not calcium oxide) to both neutralise and absorb. Formaldehyde is effectively soaked up with our good friend vermiculite or any other mineral based absorbent; you could also use it on the bromine. On the Envirostore web site ,in the For Schools section, you will find an information sheet on spill kits which has some more information on spill kit make up.

-putting together a spill kit for the school laboratory is as simple of using vermiculite or similar , having it in a labelled container such as a 20 litre plastic pail and having a few at convenient locations in the prep room , store and lab. For corrosive spill kits throw in some soda ash for acid spills or sodium acid sulphate for alkaline spills in with the vermiculite The best neutraliser for ammonia solutions is citric acid either as is or with the vermiculite.

-solid spills are best swept up and put into a heavy duty plastic bag , contained in a pail and labelled. This is prescribed chemical waste , as is a liquid spill that has been soaked up , and you therefore need to have spill kit wastes disposed of by your waste disposal company.

- do not use sand as an absorbent , or soil or sawdust. None of these are effective and in some cases you can get a chemical reaction when using on certain nasty chemicals like nitric acid for example.
- if you consult a Safety Data Sheet for information and advice on dealing with a chemical spill. prepare to be disappointed and disheartened. It is the rare SDS that actually has any information of a useful nature regarding a chemical spill. The suggestion to ring your local authority (I suppose the EPA) is of little use when you have a room filling with fumes and smoke or some pool of liquid is fizzing in a corner of the lab and eating its way through the floor to China while you frantically flip over pages of the SDS seeking some guidance. Get in first and get the spill kit organised before you start.

If you have any questions dealing with chemical spills or splashes, we at Envirostore are happy to help so feel free to contact us. (We wont tell you to ring the EPA)

If you have any comments both good and critical you can contact me or the editor of Lablines, Sam Gunning.