Welcome to the Wonderful World of Waste (and the school laboratory)

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This is number ten in the wonderful world of waste series and this one will look at what actually happens to your chemical waste once it is collected. It's a question that is still often asked of us when are on site at your school.

The simple answer is it depends on what it is. (naturally) Generally the choice of disposal method is predicated by the dangerous goods class of the waste . The easiest class to dispose of and luckily the most common and widespread is the class 3 items , the flammable liquids. Virtually all flammable liquids are disposed of via a process called Energy Recovery. This means that the waste is burnt to recover its energy and is thus used as a fuel , alternate or otherwise. The application is applied to flammable liquids and non flammable organic liquids such as hydrocarbon based oils and vegetable oils, aqueous paints, pesticides and herbicides and the like. Once we get your waste back to Envirostore HQ here in sunny Campbellfield, it is consolidated from your original containers or the handy 10 litre carboys we suggest you use, into a larger volume container such as a 200l or 1000 litre intermediate bulk container or ibc. This is a portable square plastic tank encased in a metal cage and able to be lifted by a forklift. You may have seen ibcs around the place in use as water containers in factories or on farms. Their portability is their best feature. We routinely have about three or four on the go at any time , not only for flammable liquids but also for the aqueous liquids-more of them later.

The ibc of flammable and organic liquids is filled from small containers and when full is stored in the class 3 area of HQ until we are ready to send it out to a specialised facility. This specialised facility further mixes the contents of the ibcs it receives into much larger volumes after testing for a number of important parameters. Number one is calorific value or CV. Other analyses include a metals scan, polychlorinated biphenyls , water content and reactivity tests. The finished blend with a known CV is transported in a bulk shipping container of approximately 22,000 litres to a cement kiln in either Tasmania or Queensland. Cement manufacture requires very high temperatures ie in excess of 2000 degrees, so is a high energy user. Normal fuels include coal and gas. If either of these can be replaced with alternate fuels in the form of waste flammable liquids, then we have a desirable environmental outcome. The reason for blending alternate fuels to a known CV is to maintain the energy input of your fuel . Coal and gas have known calorific values and no blending is normally required and kilns need to be run at a certain maintainable temperature to efficiently operate.

Potential problems we face during consolidation of waste flammable liquids include adding chlorinated solvents to the mix. Chlorinated solvents must not exceed 3-4% of the mix as their CV is not that high and the chlorine present when burnt becomes a corrosive gas which must be trapped and scrubbed at the kiln exhaust. Other chemical trouble makers include isocyanates which are used as catalysts when producing polyurethane foams and resins (thankfully rarely if ever encountered at schools) and coils of sodium wire used as a water remover from some solvents and stored within the bottle (benzene is a common one but also never seen these days in schools) .

The other problem is the disposal of the emptied containers. If you are using the 10l carboys to consolidate your class 3 items then these are reused. Glass bottles and smaller plastic containers need to be disposed of hence the cheaper per unit volume for the carboys as compared with the smaller containers. As can be seen , energy recovery is a highly desirable treatment for flammable and organic liquids.

What of the other waste types and dangerous goods classes you ask. The class 8 corrosive liquids, acids and alkalis , are probably the next biggest waste type encountered and luckily these can be used against each other via that wonderful chemical treatment of neutralisation. Any unopened bottles of mineral acids can potentially be reused or recycle (there is a difference -more later) but diluted acids or acidic liquids are easily treated with alkaline liquids, producing salts in solution with pH values close to seven. Envirostore doesn’t only cater for the chemical disposal requirements of schools but does operate in the big bad world of chemical waste from

commercial and research laboratories and industry. Some of the laboratory chemicals we encounter from these facilities would make your hair curl if not fall out and these need to be treated as well. Neutralisation is used for the corrosives here as well and is very effective. Monitoring includes balancing the acids with alkalis via pH measurements as you go, and keeping any water reactive chemicals out of the system. Neutralising your acidic and alkaline water in the school lab is an effective way of keeping your volumes down but that doesn't mean you can flush neutralised solutions down the sewer. Remember neutralisation will produce inorganic salts in solution such as nitrates and nitrites for example and these are not always welcome in the sewer. We will have at least one ibc always on the go for neutralising corrosive wastes and when full it is taken to another specialised facility who will use treatments such as aeration, flocculation , and sedimentation to treat the waste to a point that makes it suitable to be sent to the sewer. The volumes of treated waste here are a tad greater than your few litres in the lab but the testing they are required to do is varied and widespread and has to be done by an independent laboratory before discharge to the sewer is allowed. The sewer has to look after all the domestic sewerage Melbourne generates and we don't need any chemical contamination from industrial sources making life difficult for the micro organisms that make our sewers operate.

One common factor is all this consolidation and mixing is the present of a chemist who has to decide what can and can't be mixed together. It's not always straightforward and a lot does depend on the chemical knowledge and experience of the chemist. Very important people in the waste business the chemist.

Next article we will look at the other classes and how they are treated and what the options are for the more exciting chemicals and associated chemical wastes.

Any comments on this or previous articles can be addressed to the author or to Samantha Gunning the Lablines editor. Any topics anyone would like mentioned also just sing out.