chemical disposal for school laboratories

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POISON S1

KEEP OUT OF THE REACH OF CHILDREN — NOT TO BE TAKEN

FOR THE DESTRUCTION OF VERMIN

S·A·P

TRADE MARK

RABBIT AND CROW POISON

ALSO FOR OTHER PESTS

ACTIVE CONSTITUENT 4.0% YELLOW PHOSPHOROUS

SAYERS ALLPORT PTY. LTD.
"NORTHAM PARK", BANKSTOWN,
N.S.W.

2 LBS. NETT


AMCOR
RECYCLING FOR THE FUTURE
HANDLE WITH CARE
NON-RETURNABLE
WARNING
LEAD WASTE
BIO-RAD

Chemical waste takes many forms as the previous slides show. The SAP is a now deregistered agricultural chemical used for vermin control , the second is at the University of Tasmania in Hobart , chemistry department.
Chemicals from your school labs will include old and redundant chemicals, chemical wastes resulting from pracs, wastes from chemical spills, empty chemical containers for example

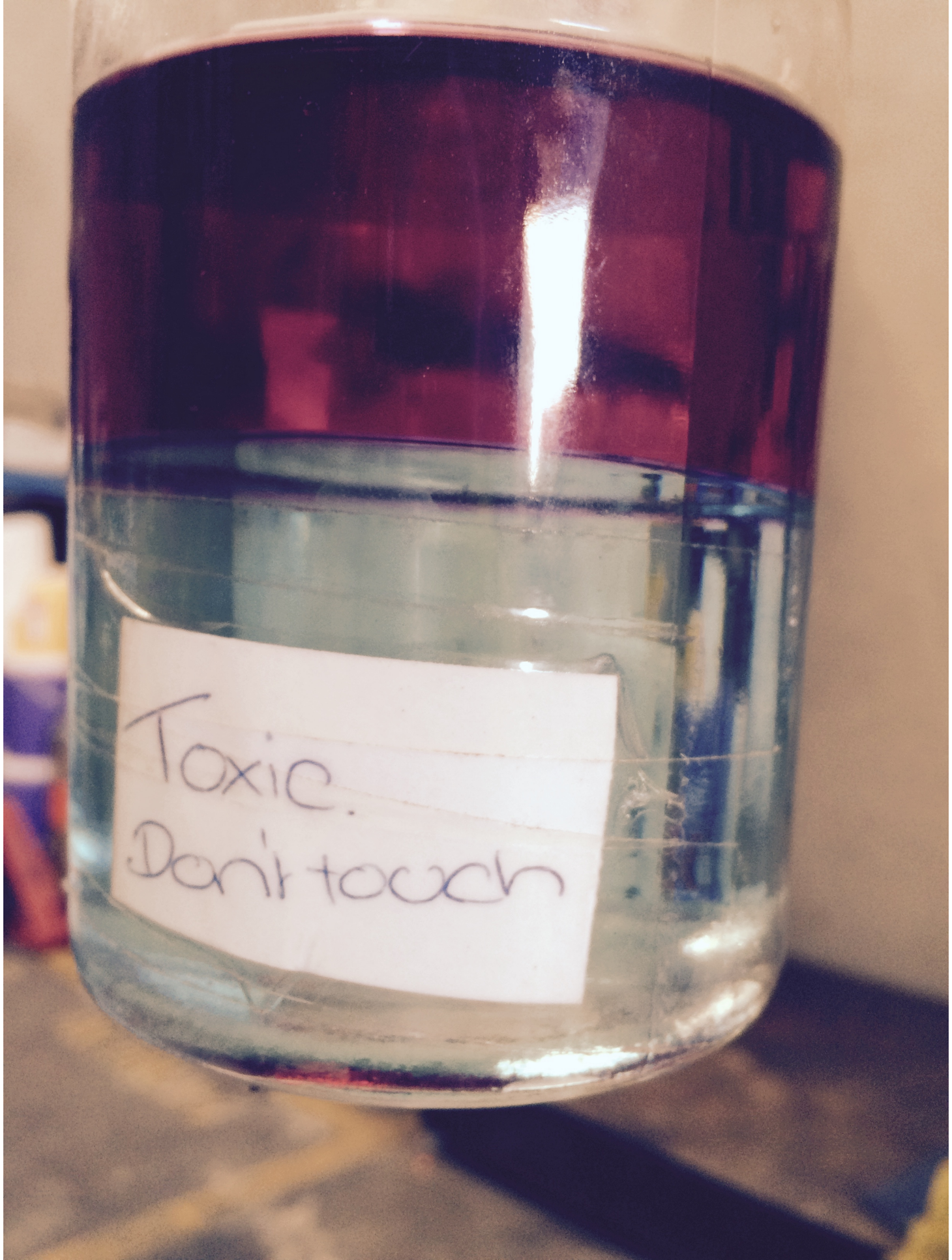
In all cases, waste must be handled and disposed of according to the Environment Protection Act and associated Regulations, as administered in Victoria by the Environment Protection Authority. The company that collects your chemical waste must have a permitted vehicle which takes the waste to a licensed premises. Usually its the same company. Also an electronic waste tracker must be generated by the waste generator (you) after registering on the EPA Portal

Apart from using an EPA licensed disposer and transporter, the following two points are your basic and essential requirements:

1) the dangerous goods class if any of your chemical wastes determines how you store and label it, exactly as you do with your “normal “ chemicals.

The chemical and physical properties DO NOT CHANGE just because a chemical becomes a waste. Some dangerous goods wastes are not regulated by EPA such as gas cylinders, explosives and radioactive materials. The old name for chemical wastes was PIW or prescribed Industrial Waste. Its now called Reportable Priority Waste -RPW. E waste and batteries are now included

2) labelling and storing your chemical wastes must address dangerous goods , more so than hazardous substances because the wastes are being transported off site . Hazardous substances and labelling according to the GHS have to be addressed when there is a chance of being exposed to the chemicals but the DG aspects take precedence and are adequate in informing all parties, i.e. disposers, transporters and treaters of the waste of the possible dangers


Toxic.
Don't touch

IODINE WASTE

CHEMICAL WASTE

COPPER WASTE

CAUTION
KEEP OUT OF REACH OF CHILDREN
DIGGERS
methylated
IODINE SOLUTION WASTE

LEAD WASTE

The previous two slides demonstrate two of the biggest errors we encounter when collecting waste
The inadequate label and the use of unsuitable containers to store the waste

Labels must be unambiguous and impart complete information as to the contents of the container. The label should not consist of just a chemical formula without the name being present. Not everyone can read a formula.
Who knows what CH3CH2SH is for example. Also the label should not be an exercise in subterfuge such as"this belongs to Barry-don't touch" or a code such as "solution number R2335a"
Any chemical information of importance such as the concentration of a mineral acid or if a flammable liquid is present ; a phenolphthalein solution is usually dissolved in ethanol but looks water white. You need to spell out that the phenolphthalein is a solution in ethanol, which is a class 3 flammable liquid
You can usually never put too much information on a label-the opposite is certainly true

The use of unsuitable containers to hold your waste is very common. Using second hand containers especially food containers such as orange juice bottles or plastic milk bottles to hold photographic waste was very common when wet way photography was in vogue a few years back. Even using old winchester bottles , which are 2.5l glass or plastic is not encouraged UNLESS you ascertain if your waste is suitable for that container AND you change the label. The wrong label is sometimes worse that the deficient label. A good waste disposal company will supply you with compliant containers to hold most of your liquid chemical wastes and should also inform you as to what types of wastes can be consolidated together. The easiest one as far as school chemical wastes go is the flammable and organic wastes. These include all solvents, alcohols, esters, oils both vegetable and hydrocarbon, organic liquids like kero and thinners, glycerine, dilute acetic acid etc. There is rarely any chemical reaction if organic peroxides and isocyanates are avoided . These are encountered in resin kits for the peroxides , usually polystyrene resins and the isocyanates are used in two part paints such as those in automotive paints. Your school may have an automotive or spray painting facility that uses polyurethane coatings


FLAMMABLE LIQUID 3
FLAMMABLE SOLID 4
SPONTANEOUSLY COMBUSTIBLE 4
DANGEROUS WHEN WET 4
OXIDIZING AGENT 5.1
TOXIC 6
CORROSIVE 8
MISCELLANEOUS DANGEROUS GOODS 9
LIFETIME 1.83 M STANDARD TABLE


303949
3/3
804-4
M&B
'VOLUCON'
PHOSPHORUS PENTOXIDE
CHEM-SUPPLY
SODIUM HYDROXIDE
UNILAB
SODIUM SULPHIDE
CHEM-SUPPLY
NITRIC ACID
70% w/w
CHEM-SUPPLY
UNILAB
AJAX CHEMICALS
BARIUM NITRATE
AJAX CHEMICALS
SODIUM SULPHIDE LR
500gm
18.2.04

- So what is the procedure in producing a waste tracker?

- The disposer (ie the school) goes to the EPA Portal at www.epa.vic.gov.au/portal and registers as a waste producer. The old system of registration is not transferrable to the new portal. You will receive a login name and password within a few days

- When having waste ie RPW removed the disposer must classify the waste (the majority of times for school laboratory chemicals it is T100), indicate the amount, collection address, transporter, treatment type and waste receiver. These are usually all via drop down lists.

- The industry code is also required and for secondary schools it is 8022.

- Don’t generate the tracker until the collection is organised .

- All States have something very similar in place. All waste movements are tracked

- All transporters and treaters will have licenses and permits or permissions in place issued by the EPA Don’t use anyone who doesn’t have these

- The transporter and receiver/ treater can generate a tracker on your behalf when all else fails but we recommend you give it a go


CHEP
CONTROLLED WASTE
OX 47 20L
DANGEROUS GOODS
CONTROLLED WASTE


CONCENTRATED
ric Acid
IVE
asses
Hydrochloric Acid
HCl
Corrosive. Wear protective
thing. Rinse affected areas with
water. Give water to drink if
ested. Seek medical assistance
Class 8
Concentrated

What about disposal via the sewer or to an under sink trap? Disposal to the sewer is via the sink and as far as industry goes is illegal unless a trade waste agreement is in place. The school may have such a thing but is usually only for large volume disposers. The sewer is a treatment system that relies on bacteria and microorganisms to treat all Melbourne's normal sewer waste from toilets , showers . kitchens and the like . This treatment is particularly sensitive to bactericides especially metals such as copper, silver, nickel, cadmium, mercury and cobalt for example. These should never be put down the sink. They are effective bactericides at part per million levels. Any low pH liquid is also not welcome in the sewer system as they can effect the concrete pipes of the sewer. Under sink traps which were commonly used in dark rooms had calcium carbonate chips in a tank with baffles that held the liquids from the sink to hopefully neutralise any acids wastes. Unfortunately the sinks were commonly used for any waste type and liquids tended to stay in the trap for a period of time with subsequent proliferation of smells and general nastiness

The under sink traps hence rarely achieved the hoped for “pretreatment” of acid wastes going to the sewer. They filled up with grease and sludges which coated the chips rendering them ineffective in the event that some acids were ever poured into the sink. Many schools have removed the traps and introduced chemical handling practices so that acidic wastes are disposed of to the chemical disposal man along with the other wastes. Another curious point is that most photographic wastes are alkaline so the chips would have had zero effect on these.

In summary no waste to the sewer unless it is supposed to go there-use the normal disposal services and don't use the under sink traps as they achieve very little other than odours and were never designed treat any chemical wastes other than mineral acids.

Wastes Requiring Special Handling

1) infectious and medical wastes: these include sharps and syringes and wastes from dissections , old growth media and swabs, wastes from the medical room such bandages , petri dishes both alive and otherwise i.e. with live bacteria or moulds and the yellow medical waste containers.

All these wastes apart from dissections involving animal cadavers or animal parts can be rendered inactive or sterile by chemical means such as use of a disinfectant or by autoclaving which is elevated temperature and pressure. The animal stuff can be disposed of with general rubbish in the school skip-it is rarely prescribed waste i.e. requiring disposal with EPA requirements. The sharps and syringes and waste from medical procedures should go into a yellow sharps medical waste bin. The bin is removed with your other chemical wastes. Autoclaved waste is also taken with chemical wastes and the use of disclosing tape is recommend which confirms that the required heat and pressure sufficient to kill all viable organisms has been reached.

Chemical disinfection requires either a chlorine based liquid such as bleach (sodium hypochlorite) or a phenolic such as pinoclean and these days the return of chlorhexidine and mercurochrome are upon us. Other good disinfectants are betadene which is iodine based and very effective and ethanol based liquids which should be a maximum 70% ethanol. Any higher concentration won't be sufficient to penetrate the cell walls of the organism so don't use methylated spirits. These disinfectants are also of use for cleaning up spills of any bacterial material and for cleaning up equipment and work areas

2) Radioactive wastes: these are usually in a kit containing three sources, commonly an alpha, beta and gamma source. The three golden rules for radiation safety are to observe time, distance and shielding. Minimise the time of exposure , be aware that the inverses square law applies so distance from the source reduces the amount of exposure and observe the correct shielding. Lead is only effective for gamma sources (cobalt 60) . Beta sources such as Sr90 are shielded with aluminium and alpha sources such Am 241 are shielded with virtually anything solid. It is recommended that the school has some sort of radiation meter with a Geiger Muller tube to be able to detect ionising radiation and to monitor the effectiveness of the shielding.

3) mercury wastes: this includes both elemental mercury such as from a thermometer or barometer and mercury salts such as the chloride and nitrate. The salts are far more poisonous than the element, the latter is a class 8 dangerous good because it is corrosive to many metals while the salts are class 6 toxics and really should not be in a school laboratory. If a mercury salt must be used go for the insoluble ones such as the sulphate or one of the oxides.

Spills of elemental mercury can be dealt with using one of the commercially available mercury spill kits like the sponge in the lid units which soak up the mercury and hold it in a suitable vessel for removal. When you collect elemental mercury for whatever reason do not use a glass coffee jar. Mercury has a density of around 13.5 g/cm3 so 1 litre will weigh 14 kg. A coffee jar is designed to hold maybe half to1 kilogram. To soak up mercury that can’t be collected with a dropper or similar you can use zinc granules (not dust) which will form a solid amalgam with the mercury and can be swept or vacuumed up. Do not use sulphur- it just makes a bigger mess and doesn't work. Don't panic if you have a mercury spill and store it in small plastic vessels and not in glass.


DANGEROUS POISON 57
HYDROFLUORIC ACID
CORROSIVE
8
CHEMICAL WASTE
NITRIC ACID
AR

Consolidation of Liquid Wastes

Many liquid wastes can be added together to reduce the number of containers for disposal thus reducing your disposal costs. The example of the flammable or organic liquids has already been shown and is applicable for virtually any organic liquids with few exceptions

The inorganic and aqueous wastes need a bit more detail but in general you can mix similar pH liquids (i.e. acids with acid and alkalis with alkalis) without fear. The exceptions are any liquid containing nitrates or any acidic liquid with nitric acid. These should be left alone as they tend to react unfavourably. Mixing acids and alkalis can be done but is not advisable with any strong mineral acid or strong alkali such as sodium and potassium hydroxide. Leave these alone also. The neutralisation reaction is far too vigorous. Redox reactions such as iodine solution and sodium thiosulphate or chrome 6 and metabisulphite are generally worry free and many metal solutions will precipitate with ammonia or lime solutions to give inert precipitates. You should check with the texts or a chemist before embarking on any internal waste treatment exercise and Envirostore is always available to answer questions and provide guidance.

we don't recommend you mix any solid wastes together as the result won’t really be of assistance to the waste disposer.
The approach of any good disposal firm dealing with laboratory chemicals is to work out what to do with the particular chemical.
The choices include reuse and recycle (not the same thing) , energy recovery, incineration, chemical treatment and landfill.
Which treatment is applicable comes back to the chemical and physical property of the chemical and the more complex a mixture just requires more work. Some mixtures are relatively easy such as flammable solvent wastes, some not so easy such as those items in the previous slide.

Chemicals to be wary of: consider disposal

concentrated formic acid forms carbon monoxide on standing and can blow up the bottle. Periodically open the bottle. Calcium hypochlorite deteriorates over time and is very reactive with many substances , even water. White or yellow phosphorous is pyrophoric and must be stored under water. Red phosphorous is a flammable solid and nowhere near as nasty as Mr White.Toluene and xylene are close relatives of the known human carcinogen benzene. Ammonium dichromate is said to be explosive when dried and heated and is a strong toxic and carcinogen. Soluble mercury compounds are highly toxic

There are plenty of others and a list of “not for school” recommended chemicals including those above is on our web site


Henderson
seeds
Developed Through
field research
DIVERSEY
pyroneg

- The last two slides are examples of what we come across in the waste world

- The blue powder is a dye powder from an abandoned factory

- The old chemicals are from a personal laboratory at a house in Camberwell.

- What they have in common for starters is that it will be expensive to dispose of both these lots due to in the first instance poor “presentation” and lack of packaging and in the second example the sheer number of very old and poorly labelled items.

- Be Safe