



LABORATORY CHEMICAL WASTE – PUB 28

This brochure provides guidance to laboratories on the correct disposal of laboratory waste containing chemicals to sewer. It is not intended to give guidance on the disposal of materials on a chemical-by-chemical basis. There are excellent references available and a selection of these is listed below.

This brochure also provides guidance on best practice laboratory waste management with particular reference to discharges to sewer.

Laboratories vary greatly in the quantity and nature of chemical wastes they produce depending on the type of laboratory: pathology, mineral testing, school, chemistry research, pharmaceutical, and so on.

In all cases of chemical waste discharge to sewer, an application to discharge must be made to the Commercial and Industrial Services Section of the Water Corporation.

Who does this information apply to

This brochure applies to all laboratories discharging chemical waste to sewer. It does not apply to radioactive or microbiological wastes. Refer to brochure ***Radioactive Substances – Pub 18***.

Chemicals of Major Concern

While small amounts of a wide range of chemical residues produced in laboratory operations may be safely disposed of to the sewerage system, there are many chemicals for which this is not appropriate.

Of particular concern are the following:

- Persistent chemicals such as heavy metals and various organic compounds
- Water-immiscible organic liquids such as petroleum hydrocarbons and chlorinated compounds
- Compounds which produce toxic vapours, such as cyanide, ammonia, formaldehyde and glutaraldehyde
- Strongly acidic or alkaline wastes
- Highly reactive chemicals or flammable wastes

The Water Corporation controls the input of chemicals to its wastewater systems. This is necessary to protect the wastewater system itself, our workers within the system, the safety of the community, and ultimately, to protect the environment.

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Waste Avoidance and Waste Minimisation

Much can be done to avoid or minimise the production of chemical wastes in the laboratory. The following hierarchy of strategies is recommended:

1. Replace hazardous compounds with less hazardous compounds, such as by selecting alternative protocols that avoid using certain toxic components.
2. Minimise the quantity of hazardous materials used such as by reducing testing procedures to semi micro or micro scale.
3. Recycle hazardous compounds (either within the laboratory or by external contractors).
4. Pretreat wastes to remove hazardous materials prior to discharge of wastes to the sink such as by chemical destruction, precipitation, solvent extraction or ion exchange.

Best Management Practices

To assist in implementing waste avoidance and waste minimisation measures, the following management practices should be adopted:

- Avoid over-ordering chemicals, thereby minimising costly waste disposal.
- Ensure that all chemicals, especially those to be disposed, are properly labelled (including experimental and analysis samples) - disposal companies tend to treat unlabelled containers as the highest risk (and highest cost).
- Require staff leaving the laboratory's employ to clear out all their old chemical stocks, either by returning them to store or properly labelling them and arranging for correct disposal.
- Take periodic inventories of all chemicals, and investigate all likely 'hiding places' for chemicals.
- Segregate incompatible waste solvents prior to cartage off-site, for example organochlorines, water miscibles and water immiscibles.
- Educate staff through regular training, target setting and feedback.
- Put up clearly visible signs to guide staff in correct procedures.
- Establish a laboratory waste disposal manual and ensure it is updated regularly.
- Provide appropriate handling and safety equipment to make correct waste management easy and convenient.

Specific Requirements

1. All components of an industrial waste discharge must comply with the Corporation's acceptance criteria. Refer to brochure **Acceptance Criteria for Industrial Wastes - Pub06**. Where there is no criterion for a waste component, limits are set on a case-by-case basis.
2. All laboratory liquid waste approved for discharge to the sewer must pass through an appropriate pretreatment fixture prior to discharge. In the case of acidic wastes (such as from mineral laboratories) a neutralisation fixture will be required. Other types of laboratories may require different pretreatment.
3. Where applicable, correctly monitor and maintain sewer pre-treatment fixtures and equipment and keep a central register of these records.
4. Laboratory chemicals must not be stored in such a way that spillages will enter laboratory sinks. Significant volumes of liquids should be stored in areas with appropriate containment. Incompatible chemicals should not be stored together.
5. Spillages of organic solvents must be contained with absorbents such as sand, diatomaceous earth or appropriate absorbents, and not flushed down the sink.
6. Organic liquids that are immiscible with water must not be disposed to the sink.

7. Small amounts (less than 1 litre of concentrated solution) of wastes containing organic liquids miscible with water may generally be discharged to sink. Where these liquids have toxic or flammable vapours (such as formaldehyde) the wastes must be diluted with large amounts of water (see Hospitals below). Larger quantities must be either destroyed chemically prior to discharge, or the wastes either recycled or disposed of off-site.
8. Large quantities of concentrated acids or alkalis (greater than Winchester size - 2.5 litre) must be neutralised prior to disposal to sink.
9. Wastes containing the heavy metals arsenic, cadmium, mercury and silver in amounts above 1 gram, or copper, chromium, lead, nickel and zinc above 10 grams must be pre-treated to remove these metals prior to discharge of the waste to sink.
10. Water miscible wastes apart from those already mentioned may generally be discharged to sink with appropriate dilution.
11. Small quantities of volatile solvents can be disposed of by evaporation in a fume hood. Larger amounts must be sent for recycle or disposal off-site.
12. For hospitals in Perth discharging to major Wastewater Treatment Plants, glutaraldehyde solutions are to be diluted with water to below 0.1% before discharge to the sink. No more than 40 litres of 2% glutaraldehyde (or equivalent mass load of other concentrations) is to be discharged per day.
13. For hospitals in country areas, the acceptable amount of glutaraldehyde will be determined on a case-by-case basis

References

- AS/NZS 2243 - Safety in Laboratories, Standards Australia.
- AS2508 - Safe Storage and Handling; Information Cards for Hazardous Materials', Standards Australia.
- Handbook on Laboratory Health and Safety Measures, 1985, edited by S.B. Pal (MTP Press).
- Handbook of Toxic and Hazardous Chemicals & Carcinogens, 2nd Edition, 1985, by M. Sittig (Noyes).
- Dangerous Properties of Industrial Materials, 7th Edition 1989, edited by N.I. Sax & R.J. Lewis (Van Nostrand Reinhold).
- Hazards in the Chemical Laboratory, 4th Edition, 1986, edited by L. Bretherick.

More Information?

For advice on recycling options or ultimate disposal of wastes which cannot be discharged to sewer, please contact the Department of Environment and Conservation.

You can find more information about the Industrial Waste service, including detailed acceptance criteria, on our website at http://www.watercorporation.com.au/industrialwaste_index.cfm.

Or if you prefer, please call us on 13 13 95.