WAYS TO REDUCE HAZARDOUS WASTE IN THE LABORATORY

1. Write a waste management and reduction policy.
2. Include waste reduction as part of student and employee training.
3. Use manuals such as the University's Waste Minimization manual, "Chemical Management Guidebook" and other publications such as the American Chemical Society's (ACS) "Less is Better" or "ACS Waste Management Manual for Laboratory Personnel" as part of your training.
4. Create an incentive program for waste reduction.
5. Centralize purchasing of chemicals through one person in the laboratory.
6. Inventory chemicals at least once per year.
7. Indicate in the inventory where chemicals are stored.
8. Update the inventory when chemicals are purchased or used up.
9. Purchase chemicals in the smallest quantities needed.
10. If trying out a new procedure, try to obtain the chemicals needed from another laboratory or purchase small amounts initially. After you know you will be using more of these chemicals, purchase in larger quantities unless you can find what you need from another source.
11. Date chemical containers when received so older ones will be used first.
12. Audit your laboratory for waste generated including the quantity, type, source and frequency of generation and look for ways to reduce.
13. Keep MSDSs for chemicals used on file.
14. Keep information about disposal procedures for chemical waste in your laboratory.
15. If possible, establish an area for central storage of chemicals.
16. Keep chemicals in your storage area except when in use.
17. Establish an area for storing chemical waste.
18. Minimize the amount of waste kept in storage. Request a chemical pickup as often as you need.
19. Label all chemical containers as to their content (even those containing only water).
20. Look for alternatives to solvent use. See "Solvent Substitution Data Systems", (http://es.epa.gov/ssds/ssds.html).
21. Keep recyclable waste and excess chemicals separate from non-recyclables.

22. Keep nitric acid waste separate from other inorganic acid wastes.

23. Keep hydrofluoric acid waste separated from other inorganic acid wastes.

24. Keep non-hazardous chemical wastes separated from hazardous waste.

25. Keep highly toxic wastes separated from inorganic acid wastes.

26. Avoid experiments that produce wastes that contain combinations of radioactive, biological and/or hazardous chemical waste.

27. Keep chemical wastes separated from normal trash.

28. Develop procedures to prevent and/or contain chemical spills – purchase spill cleanup kits, provide containment in areas where spills are likely.

29. Use the least hazardous cleaning method for glassware. Use detergents such as Alconox and Micro on dirty equipment before using KOH/ethanol bath, acid bath or No Chromix.

30. Eliminate the use of uranium and thorium compounds (naturally radioactive).

31. Eliminate the use of chromic acid cleaning solutions.

32. Substitute red liquid (spirit filled), digital, or thermocouple thermometers for mercury thermometers where possible.

33. Use a bimetal or stainless steel thermometer instead of a mercury thermometer in heating and cooling units. Stainless steel laboratory thermometers may be an alternative to mercury thermometers in laboratories, as well.

34. Evaluate laboratory procedures to see if less hazardous or non-hazardous reagents can be used.

35. Review the use of highly toxic, reactive, carcinogenic or mutagenic materials to determine if safer alternatives are feasible.

36. Avoid the use of reagents containing: arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver.

37. Consider the quantity and type of waste produced when purchasing new equipment.

38. Purchase equipment that enables the use of procedures that produce less waste.

39. Review your procedures regularly to see if quantities of chemicals and/or chemical waste could be reduced.

40. When preparing a new protocol, consider the kinds and amounts of waste products and determine whether they can be reduced or eliminated.

41. When researching a new or alternative procedure, include consideration of the amount of waste produced as a factor.

42. Examine your waste and excess chemicals to determine if there are other uses in your laboratory. Neighboring laboratories, departments or

non-laboratory areas might be able to use them.

43. Review the Chemical Redistribution listing for available chemicals (www.ehs.ohio-state.edu).

44. When a solvent is used for cleaning purposes, use contaminated solvents for initial cleaning and fresh solvent for final cleaning.

45. Try using detergent and hot water for cleaning of parts.

46. Reuse acid mixtures for electropolishing.

47. When cleaning substrates or other materials by dipping, process multiple items in one day.

48. Use the smallest container possible for dipping or holding photographic chemicals.

49. Store and reuse developer and fixer in photo laboratories.

50. Precipitate silver out of photographic solutions for reclamation. Use silver recovery systems when possible.

51. Neutralize corrosive wastes that do not contain metals or other hazardous characteristics at the laboratory bench.

52. Evaluate the possibility of redistillation of waste solvents in your laboratory.

53. Evaluate other wastes for reclamation in your laboratory.

54. Scale down experiments producing hazardous waste wherever possible.

55. In teaching laboratories, consider the use of microscale experiments.

56. In teaching laboratories, use demonstrations or video presentations as a substitute for some student experiments that generate chemical wastes.

57. Use pre-weighed or pre-measured reagent packets for introductory teaching laboratories where waste is high.

58. Include waste management as part of the pre- and post-laboratory written student experience.

59. Encourage orderly and tidy behavior in the laboratory.

60. Use best geometry of substrate carriers to conserve chemicals.

61. Polymerize epoxy waste to a safe solid.

62. Consider using solid phase extractions for organics.

63. Put your hexane through the rotovap for reuse.

64. Destroy ethidium bromide using household bleach.

65. Seek alternatives to phenol extractions.

66. Collect metallic mercury for reclamation.

67. Purchase compressed gas cylinders, including lecture bottles, only from manufacturers who will accept the empty cylinders back.

68. When testing experimental products for private companies, limit donations of chemicals to the amount needed for the research.

69. Return excess pesticides to the distributor.

70. Be wary of chemical donations from outside the University. Accept chemicals only if you will use them completely within 12 months.

71. Replace and dispose of items containing polychlorinated biphenyls (PCBs).

72. Send other suggestions for waste minimization by campus mail or email to EHS, Chemical Management Program, 1314 Kinnear Road, st-clair.1@osu.edu.

Some of the information contained in this brochure is based on a publication by The University of Illinois, Chemical Safety Section.

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ENVIRONMENTAL HEALTH & SAFETY

WASTE MINIMIZATION FACT SHEET

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Future Solutions Now