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17 Steps to Minimize Chemical Waste

Smart, Inexpensive Practices to Avoid Chemical Disposal

The single largest chemical problem facing schools today is chemical disposal. The chemical disposal problem at your school started the day the school was built. The purchasing of chemicals in large package sizes, poor chemical inventory management, teacher turnover, and changes in science curriculums are just a few of the many reasons why your school may have a chemical disposal problem. What every school needs is a plan to minimize future chemical wastes. Chemical disposal is a necessary part of any chemical laboratory activity. The following 17 steps will help reduce the amount of chemicals that need to be disposed and make the disposal process easier to manage.

1. **Maintain an up-to-date inventory of your chemicals.**
   Maintaining a good chemical inventory will eliminate buying excess or unneeded chemicals.

2. **Purchase chemicals carefully.**
   Careful purchasing is the first step in decreasing the amount of unwanted chemicals and subsequent chemical disposal. To reduce unwanted chemicals, purchase smaller size packages of chemicals, only what is needed for the next 1 to 3 years, and only from chemical suppliers that will guarantee fresh chemicals. If you only need a dilute solution of a chemical, buy the solution and not a large bottle of the solid. Buying chemicals in bulk to save a few dollars ends up costing more in the long term. Disposal of unused chemicals will always cost more than any cost savings from larger sized packages.

3. **Date label your chemicals and only buy from chemical supply companies that date label their chemicals.**
   Chemicals age at different rates and knowing the age of your chemicals may help determine if they are still usable.

4. **Use older chemicals first, before they decompose.**
   This requires date labeling of chemicals.

5. **Provide good climate control for the chemical storeroom.**
   Chemicals remain fresh longer when stored in a cool, dry environment. Heat and humidity quickly degrade chemicals resulting in materials that are unsuitable for laboratory use and requiring disposal. This is particularly important during the summer months when many schools turn off their air conditioning.

6. **Ventilate your storeroom.**
   Providing a continuous air exchange in your storeroom is not only safer for you, but will provide a better environment for storage of chemicals. Imagine the quality of reducing agents after being exposed to a continuous environment of chlorine gas.

7. **Label all chemicals and laboratory solutions.**
   Any unlabeled bottle becomes a chemical disposal nightmare; first the chemical must be identified, then it must be disposed. To avoid unknown and unwanted solutions, replace or repair old labels and immediately label all prepared solutions.

8. **Prepare only enough solution for immediate use.**
   Preparing extra solution for storage frequently results in many bottles of unwanted solutions that ultimately require disposal.

Be proactive... Reduce chemical waste starting today.

9. **Never store chemicals or solutions in "homemade" bottles.**
   Storing solutions in containers not designed for chemical storage (e.g., old peanut butter jars or soda bottles) leads to a shorter shelf life of the laboratory chemical. "Homemade" bottles may not provide suitable protection from the environment or may not be compatible with the chemical. Using proper chemical containers will provide safer storage and allow for longer storage of chemical solutions.

10. **Store hygroscopic and deliquescent chemicals in *Chem-Saf*® bags.**
    Make sure the caps are on tight and use Parafilm M® around the cap for extra protection. *Chem-Saf*® bags and tight caps help keep moisture out of the container and greatly lengthens shelf life.

11. **Follow good laboratory practices.**
    Never allow students to place chemicals back into a chemical reagent bottle. Contamination from student use will dramatically reduce purity and the shelf life of a chemical. To enforce this rule, place smaller amounts of chemicals in beakers or bottles for dispensing.

12. **Never accept donations of chemicals.**
    These donations are usually of unknown age and unknown purity—why accept someone else's garbage? Buy your own chemicals fresh for best results and longest shelf life.

13. **Microscale your labs.**
    Microscale laboratory procedures can reduce your wastes a hundredfold. Many times, the quantities produced in a microscale lab can be disposed of down the drain. If you microscale your labs, also microscale the quantity of chemicals you purchase (see #2).

14. **Purchase chemical demonstration kits or chemistry student kits that contain exact quantities of chemicals.**
    This eliminates storage and disposal of "extra" chemicals. Flinn chemical demonstration kits contain enough chemicals to present the demonstration seven times. At the end of the day, there are no unused or unwanted chemicals.

15. **Look at disposal procedures first.**
    When choosing a lab or demonstration, look at the disposal procedure first. If the disposal procedure is difficult, consider microscale techniques or substituting less hazardous materials. Avoid the use of heavy metals whenever possible.

16. **Dispose of waste chemicals immediately after they are generated.**
    Do not stockpile unwanted products or other laboratory wastes. Disposal of small quantities of chemicals is easier and quicker than stockpiling them for a massive disposal at the end of the year.

17. **Keep waste solutions separate.**
    Never mix wastes from different labs unless the wastes have identical disposal methods. Adding a small amount of a lead compound to a waste crock necessitates treating the entire waste crock as a lead solution.

Implementing and following these 17 steps to minimize chemical waste will save money and improve the overall safety profile of your school.