

Ask the Experts

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Do you have a biosafety question and you're not sure who to ask? Send your questions to the "Ask the Experts" column and I'll get them answered for you. Drawing from my own experience or that of other experts in the field, we'll try to compile a thorough and comprehensive answer to your question. Please e-mail your questions to jkeene@globalbiohazardtechnologies.com or Co-Editor Barbara Johnson at barbara_johnson@verizon.net or Co-Editor Karen B. Byers at karen_byers@dfci.harvard.edu.

Chemical Decontamination of Laboratory Waste Liquids

Question

I read that liquids can be chemically decontaminated only by using chlorine-based products. Can contaminated liquids be decontaminated using other chemical disinfectants?

Answer

Let's first look at the definitions of the term "decontamination." Decontamination is defined as "to make safe for unprotected personnel by removing, neutralizing, or destroying a harmful substance, as radioactive material or poisonous gas; to make free of contamination, purify (Dictionary.com, 2008).

Liquid waste materials contaminated with infectious agents are most likely contaminated with a single type of agent (the "harmful substance") that is being used in the laboratory; therefore, decontamination is considered complete when that agent is destroyed by the decontamination process. The decontamination of liquid waste materials in a laboratory is generally performed by autoclaving. Autoclaving is the "tried and true" method for sterilization (the ultimate decontamination process) and has been proven to be an extremely effective methodology provided it is monitored appropriately.

Historically, the methodology for the chemical decontamination of liquids has been the use of those chemical agents that are acceptable for decontamination of water, i.e., the various halogens, particularly chlorine compounds. This is still true if the liquid is going to

be used for human consumption. However, if the liquid is a waste, it is possible to treat that waste with a chemical disinfectant.

Several considerations should be made when contemplating the use of chemical disinfectants for the decontamination of liquid wastes in the laboratory:

1. The concentration of the disinfectant must be the one the manufacturer recommends. The manufacturer tests the disinfectant for efficacy at a particular concentration and that concentration must be achieved when diluting the concentrated disinfectant in the waste liquid.
2. The amount of organic matter that is present in the liquid. Nutrients and waste materials, as well as increased numbers of organisms, all contribute to the effectiveness of the chemical disinfectant.
3. The time required to inactivate the organisms in the waste liquid. This is not something that anyone can pre-determine and is something that must be determined for each individual situation. You must prove the efficacy of the process.
4. Chemical disinfectants are hazardous chemicals and consideration of the method of disposal of the decontaminated material must be made.
5. Finally, and most important, is the consideration for demonstrating the efficacy of the process for the particular situation.

In commercial operations, such as fermentations, the standard practice has long been inactivating certain organisms in the fermentation tank. In these situations, it is accepted that a thorough evaluation of the consequences of using chemical disinfectants to destroy potentially hazardous organisms must be performed. That type of evaluation also should be made when we attempt to use chemicals for decontamination of waste liquids in the laboratory. You just might find that autoclaving is still the most efficient and efficacious method to ensure the destruction of biological agents in the liquid waste.

Reference

Dictionary.com. (2008). Dictionary.com web site. Available at: <http://dictionary.reference.com/browse/decontamination>