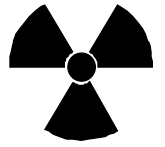




RADIATION REVIEW



UW - Madison Safety Department

Radiation Safety Program

30 N. Murray St.

262-8769

April 1999

<http://www.wisc.edu/safety>

NRC License: 48-09843-18

Bio-Safe II™

Materials Distribution Services (MDS - formerly Stores) recently changed scientific equipment vendors and no longer carries Research Products International (RPI) Bio-Safe II™ liquid scintillation cocktail. Wendy Hellwig from Biochemistry noted that the Fischer ScintiSafe™ Econo 2 (which MDS now carries) is relatively comparable, but for some applications it does not work as well as Bio-Safe II™. RPI sent a flyer around stating that they would deliver Bio-Safe II™ to your lab for \$34 per gallon. Order number is 111195, Bio-Safe II™ biodegradable Cocktail, 4 Liters/Bottle, \$34.00/Bottle (list is \$59.00/Bottle). Call (800) 323-9814 to place your order. Other information needed: UW Madison Customer No. 5370601; Quotation Number 08019A/B (reference this number when ordering). The literature notes this offer expires on 31 December 1999 and the price includes shipping to UW. Minimum order is \$50.

Yellow Bags

The UW started using yellow bags after several ambiguously labeled radioactive waste bags were mistakenly thrown out. Yellow bags were a way to reduce the risk of losing waste. We found a suitable vendor and got MDS to stock the bags. Imagine our surprise when we found MDS no longer stocked them and had a backlog of 24 orders. That being the case, Safety has ordered yellow bags. You may obtain some from our Annex in Room 19 Biochemistry.

Amendments Via WWW

We added several amendment eMail forms to our web site (see above). You can get to these forms either from CORD or Radiation Safety and can use these to add/drop radiation workers from your lab, add/change nuclide order or possession limits, or add a room (room deletions require final surveys). We developed these forms to make it easier for you to do your radiation safety business and help us have more timely records.

P-32 Detection

Safety recently completed a comparison of scintillation detector efficiencies. Scintillation detectors, also called low-energy gamma (LEG) probes, are routinely used to detect gamma ray emitting radionuclides such as I-125. Because the beta particle emitted from P-32 has a maximum energy of 1.7 MeV, it is also possible to detect it with a scintillation detector. However, the short half-life of P-32 precludes its use as a calibration source. Our study compared detector efficiencies for both P-32 and Sr-90, enabling us to calibrate the probe using Sr-90 and correlate the efficiency for P-32.

Each meter will have a different efficiency for different nuclides. Some of the factors affecting the efficiency are radiation energy, radiation type (i.e., β , γ), detector type (GM, LEG), detector area (e.g., end-window probe is 7.1 cm² and pancake probe is 20.25 cm²), type protective cap (the black plastic grill on an Eberline end-window probe stops approximately 30% of the beta particles), age of the detector.

Your meter's efficiency for different nuclides is listed on the calibration sticker placed on the side of the meter. To calculate the actual activity (dpm) for a specific nuclide, simply divide the cpm by the decimal efficiency. For example, if the meter's efficiency for P-32 is 45% and an area has a contamination level of 3000 cpm, then the actual activity is 6667 dpm (~3 nCi).

The Safety Department is investigating Cr-51 efficiency; however there are difficulties. Only 10% of decays produce radiation. The single 320 keV gamma ray emitted 10% of the time is high energy so the LEG detector efficiency is only about 5%. The GM efficiency is only about 0.2 - 0.3%. Very

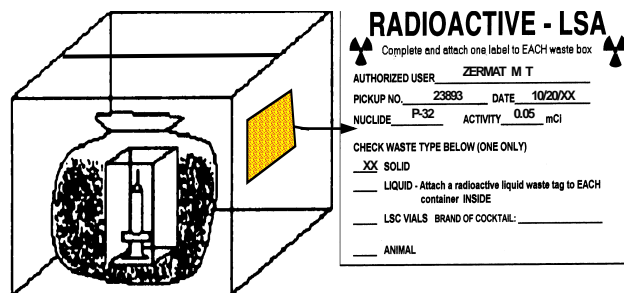
few check sources match the emission spectrum. Thus, while you may be able to detect Cr-51, the actual activity involved is probably greater than 10 microcuries.

Waste

The Safety Department collects solid and liquid radioactive wastes on Monday and Wednesday afternoons. For waste to be picked up from designated locations it must be packaged properly and the Waste Disposal Form must be completed. During the next two newsletters we will describe packaging and paperwork for the various categories of radioactive waste disposal. All of these procedures are graphically described in Chapter 5 of the Radiation Safety for Radiation Workers manual.

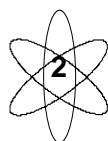
SOLID WASTE

Use yellow plastic bags to hold solid wastes within the lab. Place solid wastes in a strong cardboard box for disposal. Securely tape the bottom and top of these boxes so they will not open while being

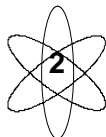


transported. Package and seal sharps

(i.e., syringes, blades, Pasteur pipette tips, broken glass, etc.) inside a small secondary plastic/cardboard container before adding this small sharps package to the other solid waste. Lead is an environmental hazard. Never put lead pigs in boxes with solid waste. Lead pigs must be packed separately. All boxes



must have a Radioactive - LSA sticker
completed and placed on one surface.



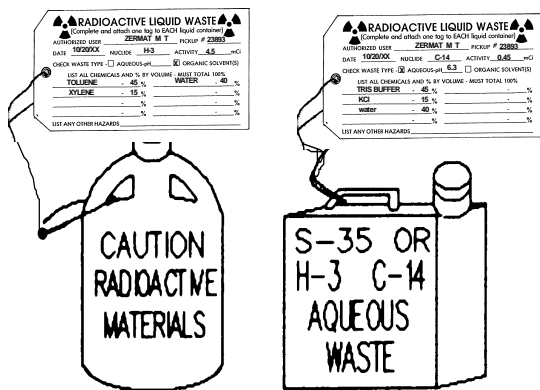
REVIEW

LIQUID WASTE

Always keep aqueous and organic solvent wastes separate and collect/store in plastic or shatter proof glass containers of at least 500 ml but not more than 4

liters. The Safety Department will furnish 1-, 2-, and 4-liter containers upon request. Use a container that is appropriately sized for the actual waste volume.

A carboy is a five-gallon container supplied by Safety that is used for large



volumes of dilute liquids (primarily ³H, ¹⁴C or ³⁵S; call Safety for other radionuclides). Carboy activity limits are listed in the table. If you need an empty carboy, call Safety and a replacement five-gallon carboy will be delivered to your buildings during waste pickups.

For safety purposes, labs should neutralize aqueous liquids so the resultant pH is between 5.5 and 8.5 (i.e., 5.5 ≤ pH ≤ 8.5). Very concentrated wastes (e.g. stock solutions), not exceeding 50 ml, should not be diluted (and need not be neutralized).

Carboy Type	Waste Type	Activity Limits (mCi)		
		³ H	¹⁴ C	³⁵ S ¹
Round	Organic	2 mCi	2 mCi	2 mCi
Square	Aqueous	15 mCi	2 mCi	2 mCi

¹Don't mix ³⁵S with ³H or ¹⁴C

Tightly seal all stock vials and package separately in a small box. Document the disposal in the proper section of the

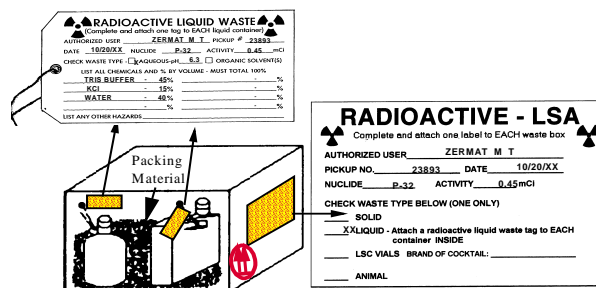
disposal form (i.e., organic liquid or aqueous liquid). Do not put solids in liquid waste containers nor liquid wastes in

solid waste containers..

Do not overfill liquid waste containers; only fill containers 2/3 - 3/4 full and allow room for thermal expansion. Seal containers securely by wrapping parafilm around a tightly closed twist-type cap (do not use foil, cracked caps, etc.).

Complete and attach a Radioactive Liquid Waste tag to each container that is larger than 50 ml; smaller containers should be considered as stock vials. List all chemical constituents, including water, methanol, etc. For small volume liquids, place in a strong, cardboard box and add packing / cushioning material to prevent breakage/tipping. Put no more than four containers into each box.

The 5-gallon carboys that Safety uses have been tested to meet DOT requirements. To dispose of carboys, complete and attach the Radioactive Liquid Waste tag and place in the appropriate location.



REVIEW

LIQUID WASTE (cont.)

During the winter months, to prevent freezing and consequent rupturing of liquid containers, do not put aqueous liquids in out-of-doors cabinets for collection until 11 - 12 noon on the day of the pick up.

Training

Radiation Safety training has been scheduled from 1 May through 26 August at Union South. All classes begin at 12:30. Training manuals can be obtained at Radiation Safety's Annex in Room 19 Biochemistry (11 AM - 2:45 PM). Classes are held on May 6, 14, 20, 26; June 1, 7, 15, 23; July 1, 9, 15, 21, 27; August 2, 10, 18, 26.

If you would like to be added to the Radiation Review mailing list please email

ralph.north@ccmail.adp.wisc.edu

or call

262-1524

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