UCI KCCAMS Facility

Swipe protocol
April 8, 2011

Swiping protocol

The use of ^{14}C as a tracer has increased dramatically over the past decade, and tracer contamination is becoming a significant problem. Reasonable precautions should be taken to avoid sample contamination (as well as contamination of the ^{14}C processing labs and other people's samples). Precautions that should be practiced include ascertaining information about your lab's equipment history; and avoiding samples, equipment, and areas likely to be contaminated. Be wary of shared facilities and borrowed equipment. Remember that contamination does not glow in the dark (unfortunately!), and that even if you could do scintillation counter tests, in many cases the samples we deal with are so small that you would see no detectable increase in activity above the counter background.

One way of testing for contamination is by performing a swipe. In this process a quartz fiber filter is rubbed over a surface suspected of being contaminated with ^{14}C tracer. The sample is taken to a special prep lab (isolated from the one where regular samples are prepared), where approximately 1 milligram of ^{14}C-free carbon carrier is added. The sample is combusted, graphitized, and the $^{14}C/^{12}C$ and $^{13}C/^{12}C$ ratios are measured by AMS. If the $^{14}C/^{12}C$ ratios are significantly elevated compared to the carrier, tracer ^{14}C was likely present.

Conducting a swipe

Equipment seriously at risk for contamination includes the three f's - fridges, freezers and fume hoods. These are the most likely suspects, but ovens, vacuum centrifuges, rotovaps, bench tops, balances, and doorknobs are also frequent sources of contamination. One swipe per piece of equipment (e.g. per hood or per bench) is enough. If contamination is present, a single swipe will pick it up.

1. First contact the AMS lab and discuss the potential problem: we will not process swipes that appear out of the blue.
2. Any surfaces that are really dusty or dirty should be wiped down beforehand e.g. with a damp paper towel, to avoid getting large amounts of dirt on the filter. If the surface is contaminated, there will still be excess ^{14}C left to pick up even after cleaning. Pre-cleaning avoids the accumulation of large amounts of modern dirt that will itself contain ^{14}C, which can bias the final result.
3. Take a baked (900°C, 2-3 hrs) 25 mm diameter quartz (not glass) filter and moisten with alcohol. The filters that we use are from SKC-West, Inc., but any similar filter is

acceptable. The SKC-West filter can be ordered from the following address, but if only a few swipes are involved, it is usually simpler if we supply the precombusted filters.

Product	**Company**
Quartz Filter, 25mm, 0.4µm, 100/pk	SKC-West, INC
Item #: 225-1825	P.O. BOX 4133, Fullerton, CA 92834-4133
	(714) 992-2780, skcwest.com

Note: i) Larger and thicker filters break apart easily and are extremely difficult to put into combustion tubes.

ii) Quartz rather than glass filters are used in order to protect the combustion tubes – glass can adhere to a quartz combustion tube and melt through it.

iii) At least in the US, ethanol is usually made from corn (i.e., contains contemporary levels of ^{14}C) whereas methanol is usually ^{14}C-free. We have seen significant levels of ^{14}C on filter blanks when ethanol was used (perhaps from traces of acetaldehyde residues in the ethanol). Use methanol if you can get it, but ethanol is acceptable. **In either case, blank filters moistened with alcohol must be provided (step 6 below).**

4. Rub the filter over the area to be swiped with a zigzagging motion a few times so you cover a reasonable area of the surface. Wear disposable gloves and change them after each swipe to avoid transferring contamination to the next one.
5. Drop the swipe in a Ziploc bag labeled with the name of the object swiped and any identifying information (i.e. location of object, etc.).
6. Take two extra filters and moisten them with alcohol to mimic the others and put them directly into bags without touching any surfaces, to act as blanks. It's a good idea to do one at the very beginning of the procedure and one at the end (record which is which).
7. Send to John Southon or Guaciara Santos at:

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Irvine CA 92697-3100 USA
Ph (949) 824-3674
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Be sure to enclose a sample list and a lab submission sheet (available on the Web at www.ess.uci.edu) with the swipes, and email copies to us as well.