

Tritium wipe tests with filter discs and wad sticks in Triathler

Key words: Tritium, wipe test

A. Filter discs

Filter discs (say dia. 37 mm) are perhaps most ergonomic in liquid scintillation wipe tests. There are two counting methods: dry and wet.

Dry method (DM):

1. Take a **glass fiber** disc and, according to your preference, wipe with a dry disc or with a moistened disc and dry it.
2. By gently rolling the dry disc, insert it in the vial, loosely leaning along its inner side wall.
3. Add 0.6 – 1.2 ml of liquid scintillation cocktail in the vial and tilt it so that the cocktail wets the disc and adheres it to the wall. Lipophilic (water-immiscible) cocktails give the highest light output and efficiency.
4. Insert the vial in counting adapter, the disc facing the detection opening, and count

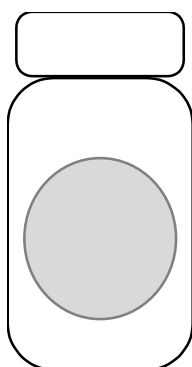


Fig. 1. A glass fiber filter disc adhered to the inner wall of a 20 ml vial.

Wet method (WM):

1. According to your preference, wipe with a dry or moistened disc.
2. Insert the disc in the vial. Minivial is recommended.
3. Add 1 ml of water, shake a bit.
4. Add 5 ml of water-accepting liquid scintillation cocktail, cap the vial and shake.
5. Insert the vial in counting adapter and count.

Comments:

DM is the most sensitive, but requires glass fiber. In DM activity stays in disc, the glass fibers forming an ideal microenvironment for detection. Other materials (paper, wad etc.) yield much poorer efficiency. Note also that only small amount of cocktail is needed in DM. This helps in minimizing background and cutting costs.

WM comes in consideration if one doesn't have glass fiber discs or if the disc is moist. The role of water is to facilitate elution of activity from the disc to cocktail. If water is omitted, activity may reside in the filter yielding poor efficiency with paper filters (like in DM above).

Illustrative H-3 efficiencies in Triathler:

DM with glass fiber:	20 %
DM with paper:	1-5 %
WM:	10-15 %

B. Wad sticks

Wad sticks are useful for wiping cavities and small spots. Their counting resembles the wet method (WM) above. Minivial is recommended.

1. According to your preference, wipe the target with a dry or moistened stick.
2. Break the stem of the stick so that it fits in a minivial and drop in.
3. Add 1 ml of water in the minivial, shake a bit.
4. Add 5 ml of water-accepting liquid scintillation cocktail, cap the vial and shake vigorously.
5. Insert the minivial in counting adapter and count.

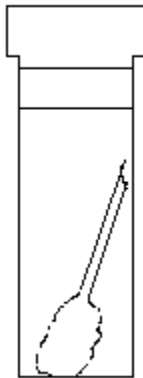


Fig. 2. A broken wad stick in a minivial

Comments:

The role of shaking (step 4.) is to spread out the wad bundle so that cocktail can more efficiently reach the activity. Typical efficiencies can be 10-15 %.

Remarks

Recovery of activity from the wiped object depends on several factors: properties of the surface, radioactive compound, and the swab; pressing force applied during wipe, degree of moistness/dryness of the swab, repeatability of procedure etc.. All this means that wipe tests should be regarded qualitative rather than quantitative. However, there is no practical alternative to monitor for weak beta emitters, especially tritium, than wipe testing followed by liquid scintillation counting. U.S. DOE regulations 10 CFR 835 (1998) suggest 10000 DPM/100 cm² for removable tritium.