General Guide for using DGT passive samplers in Waters

STORAGE

1. Store the passive samplers in a refrigerator (4°C). The DGT passive samplers provided are kept in sealed clean plastic bags containing a few drops of 0.01M NaNO3 (or 0.01M NaCl) solution. Do not open them until immediately prior to deployment.
2. Check the passive samplers about once a week to make sure they are under moist conditions. Add a few more drops of trace metal clean 0.01M NaNO3 (or 0.01M NaCl) solution if it is necessary.

INSTRUCTIONS FOR DEPLOYING DGT PASSIVE SAMPLERS IN THE FIELD
(Handling, Deployment and Retrieval)

Handling

1. Store DGT passive samplers in a refrigerator prior to use.
2. Do not remove from the sealed plastic bag until immediately (minutes) prior to deployment.
3. Only get hold of the DGT passive sampler with clean hands.
4. Do not touch the white filter at the face of the passive sampler and do not let it come into contact with anything else.

Deployment

1. Having placed the DGT passive sampler in its holder or attached it to any deployment device through the hole on the passive sampler rim using for example a fishing line, deploy the passive sampler immediately (minutes).
2. Ensure the passive sampler is deployed in flowing (or moving) water, but avoid excessive turbulence, particularly bubbles.
3. Ensure that the white face of the DGT unit is fully immersed during the deployment period.
4. Provide an accurate record to the nearest minute of the deployment time and the temperature of the water during the deployment time. If the variation is within ±2°C, a mean (or start and end temperature) will suffice. If the variation is greater, ideally the mean temperature should be obtained from an integrated record of temperature (data logger or chart recorder).

Retrieval

1. On retrieval of the holder remove the DGT passive sampler immediately (minutes), taking care not to touch the face filter.
2. Rinse the DGT passive sampler with a wash bottle stream of distilled/deionised water and shake off obvious surface water (do not dry it).
3. Place in the clean plastic bag provided and seal with minimum air space. Mark on the bag. Store it in a refrigerator.

PROCEDURES FOR ANALYSING DGT SAMPLES (for metals and a Chelex binding layer)

Sample Treatment and Analysis

1. To retrieve the binding gel after deployment insert a screw driver into the grove in the cap and twist it. The cap will be broken at the weak point. Remove the broken cap and then peel off the filter and diffusive gel layer to

reveal the bottom binding-gel layer.

2. Place the binding gel in a clean sample tube and add 1 ml of 1M HNO_3 solution (if 1.5 ml centrifuge tubes are used). Make sure the binding gel is fully immersed in the HNO_3 solution. Leave it 24 hours at least before analysis.
3. Pipette an aliquot from the sample tube and dilute it at least 5 times with Miili-Q (or deionised water) prior to analysis by AAS or ICP-MS.

Calculation of the DGT Measured Concentration

1. First calculate the mass of metal accumulated in the binding gel layer (M) using equation (1)
   $M = Ce (V_{HNO_3} + V_{gel})/fe$ (1)
   where Ce is the concentration of metals in the 1M HNO_3 elution solution (in *g/l), V_{HNO_3} is the volume of HNO_3 added to the binding gel, V_{gel} is the volume of the binding gel, typically 0.15 ml, and fe is the elution factor for each metal, typically 0.8.
2. The concentration of metal measured by DGT (CDGT) can be calculated using Equation (2).
   $CDGT = M\Delta g/(DtA)$ (2)
   where Δg is the thickness of the diffusive gel (0.08cm) plus the thickness of the filter membrane (0.014 cm), D is the diffusion coefficient of metal in the gel (see Table 1 for open pore gel. Please note the numbers for D need to be multiplied by E-6 for the required units of cm2/sec), t is deployment time (in sec) and A is the exposure area (A=3.14 cm2).

If the DGT passive samplers are accidentally dried out after long time storage, they need to be revived before deployment. Procedures for reviving the DGT passive samplers:

1. Prepare an acid washed plastic box to accommodate the passive samplers.
2. Prepare superpure 0.01M $NaNO_3$ (or 0.01M NaCl) solution with MQ water in an acid washed clean container.
3. If you don't have superpure $NaNO_3$, add Chelex-100 into the above $NaNO_3$ (or NaCl) solution (about 5 to 10 grams into 1 litre) and stir overnight to clean the solution.
4. Soak the passive samplers in MQ water (use the acid washed plastic box) overnight.
5. Pour the MQ water away and fill the box with the trace metal clean $NaNO_3$ solution from step (2) or 3 (Decant the $NaNO_3$ solution out carefully from the Chelex-100 beads). Soak the DGT passive samplers for a day.
6. Deploy the DGT passive samplers immediately after they have been revived.

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