General Information about Denitrifier Method

We use the microbial denitrifier method to measure $\delta^{15}N$ and $\delta^{18}O$ of nitrate in aqueous solutions (rain, snow, lakes, rivers, groundwater, soil extracts). Uncertainty of the measurements is typically less than +/- 0.5 per mil.

Frozen archived samples are perfect for the denitrifier method. The ideal sample size is 20 mls frozen in a 30 ml Nalgene HDPE bottle. Each sample should have a unique sample ID that means something (please avoid sequential numbering such as 1, 2, 3 etc.). Refrigerated samples can also be submitted, but they should not be held more than a few weeks after collection. We discourage clients from using any type of chemical preservatives in the samples because they may affect the bacteria used in the method.

Nitrate concentrations above 10 µMolar (equivalent to 0.14 mg/L of N-NO3) are ideal and we can analyze samples down to about 3 µMolar (equivalent to 0.042 mg/L of N-NO3) without too much trouble. Samples with nitrate > 16 µMolar are diluted with DIW before they are run. Below 3 µMolar we have been using a hybrid method incorporating ion exchange resin columns and the denitrifier lab procedure. In low nitrate situations we typically run 3 to 4 liters through the resin column and elute with 30 mls of 1 M KCl which results in a 100-fold increase in nitrate concentration. This is not a regular service and it would require coordination between our labs prior to sample collection and comes with an increase in price per sample.

Please send us an email to see when we are next running samples (turn-around is generally 3-4 weeks). If you only have a few samples, you may need to wait until we have enough samples to justify running the method. Since we must carefully control the amount of nitrate injected into the vials containing the bacteria, we have made it a policy to measure nitrate in all samples to the lab, even if customers have already measured nitrate concentrations in the samples.

Information on the isotope facility, our price structure and sample submission can be found at: http://ccb.ucr.edu/firms.html . We can run about 25 samples per day. If your samples are KCl extracts, please tell us so we can modify our procedures to accommodate them. Also, please let us know if your samples contain rain or snow – we must use two different strains of bacteria for the most accurate measurement of $\delta^{15}N$ in these samples.