



Water Talk

Volume 10, Issue 2

February 2010

Collection and Preservation of Environmental Samples for Laboratory Analysis

The proper attainment of water and other environmental samples for laboratory analysis is of undermined importance and can greatly affect the outcome of accurate, precise results. The integrity and accuracy of results acquired on site and in the laboratory can be heavily compromised if proper storage of samples is not taken with care. The timing in which certain tests are performed to retrieve a quantitative result is also dependant on the microbiological and chemical nature of the water or analyte, therefore it is that inevitable some determinations are more affected by sample storage than others. With this information in mind, guidance upon obtaining good samples for analytical testing will be advised, and details of why sample storage essentially subsist for several different reasons will be showcased.

Analytical data is only meaningful if the sample is representative of the water of interest. It is important to use care in taking the sample and also to properly preserve and store the sample if analysis cannot be immediately on site.

Cleaned polyethylene or glass bottles should be used for liquid sample containers. They should be rinsed several times with the sample water before final filling. Sample should be taken as close as possible to the source of supply to minimize the

effects of the distribution system or chemical contamination.

Generally, the shorter lapse of time between sample collection and analysis, the more reliable the analytical outcomes. Because stagnant water in a piping system will usually contains some various yet small contaminations, the water should be allowed to run for a sufficient amount of time to flush the system and the sample container should be filled slowly with a gentle stream to avoid turbulence and air bubble. A full bottle will preserve the sample by excluding air. Water from the well should be taken after the pump has run long enough to be delivering the water that is representative of ground water from the well.

Preservation could be used to retard the change that continues after sample taking. Method of preservation are retarding bacterial change, retarding chemical reaction or reducing loss of component by evaporation or adsorption. Other useful technique is acidity or alkalinity control and addition bacterial inhibitors.

Samples taken for microbiological testing is recommended to be done immediately or at least within one hour of sample being taken. They should be kept as cool as possible ($< 5\text{ C}^\circ$) without freezing, preferably packed in ice before shipment to minimized potential for biodegradation between sampling and analysis. A microbiological growth will flourish rapidly over time at room temperature, even over the course of one or two days, therefore sterilized bottle container efficiently retards this growth and is highly recommended.

The majority of oxygen scavengers used to inhibit corrosion by reducing dissolved will react quickly with atmospheric oxygen. Therefore excessive exposure to air should be avoided and samples should not be collected for later analysis but rather be analyzed immediately on site, ultimately preserving accuracy and reducing error.

Presence of microorganisms can affect the content of nitrate-nitrite- ammonia content, BOD concentrations, and the reduction of sulfate to sulfide. Chlorine residuals are reduced to chlorides, and chemicals such as sulfite, sulfide, and ferrous iron may be lost through oxidation. As so, the presence of oxygen will catalyze the oxidation of sulfite to sulfate, so immediate testing for sulfite on site is critical. It's also recommended that hot samples should be cooled to at least 122°F to avoid any significant inconsistencies of results due to temperature.

One single method of collection and preservation cannot satisfactorily assure zero change in sample chemistry and biological presence, but taking necessary preventative steps to insure high quality samples will prove whatever standard changes that are bound to occur are obsolete while accuracy of results are adequately sufficient for the greater purpose of representative analytical data.