Vortex Mixing Dilution System for Geological Applications

PETE WINSHIP[1*], JON PETERS[1], JAMES BLOCK[1], DAVID CLARKE[1], CHRIS LAY[1]

[1]143016 Industrial Road, Omaha, NE, USA, 68144, (*correspondence: peter.winship@teledyne.com)

The earth's crust comprises an elemental makeup that spans many orders of magnitude from percent to less than ppt. This reality poses a problem for the analytical lab that requires analyis of elements at each of these levels. Historically, several instruments must be involved to determine each concentration or several manual dilutions must be performed.

Often times an element concentration may be much higher than anticipated and necessitates additional dilution steps and re-runs, and is only realized at the end of the analytical run. This increases the risk of erroneous manual dilutions by increasing the number required.

In this work we present a vortex mixing dilution system that helps automate the many dilution levels required for geological analysis. The SDX_{HPLD} dilution system performs both prescriptive and intelligent dilution, allowing the analyst two potential ways to bring an element into the calibration range both when an element concentration is expected to be out of calibration range as well as when the concentration is unknown.

An integrated on-board vortex mixing station ensures that the dilution is fully mixed and homogenous prior to introduction to the instrument; therefore, the SDX_{HPLD} maintains data quality.

In this contribution, figures of merit such as precision, accuracy, and carryover are discussed, as well as recovery results for several elements post dilution.