Carbon and Oxygen Isotope Fractionation of Pressurized CO2 as a Function of Temperature

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During liquid-vapor phase transition, CO\textsubscript{2} can undergo isotopic fractionation in both C and O. This phase transition can occur during routine cylinder handling, such as gas expansion or while subjecting the cylinder to cold temperatures without allowing the cylinders to come to thermal equilibrium prior to use.

This work examines the isotope changes for both C and O in a series of controlled experiments on dual phase (liquid-vapor) and single-phase (vapor only) carbon dioxide contained in pressurized gas cylinders at sub-freezing, ambient and elevated temperatures. The isotopic values were measured during the temperature equilibration from either cold or elevated temperatures to room temperature. Isotopic values were observed to vary when the gas was at sub-freezing temperatures but not from elevated temperatures. Stable isotope practitioners, who rely on pressurized carbon dioxide as a working IRMS laboratory reference gas, will find this work useful.