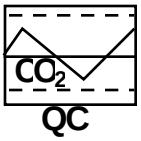

University of California, San Diego
Marine Physical Laboratory, 0902
9500 Gilman Drive
La Jolla, CA 92093-0902

Certificate of Analysis

Reference material for oceanic CO_2 measurements

Batch #1 (Bottled on January 29, 1990)

This reference material consists of natural sea water sterilized by a combination of filtration, ultra-violet radiation and addition of mercuric chloride.

Analysis Results

The various procedures used for these analyses are detailed overleaf.

Salinity	33.508	
Total dissolved inorganic carbon		2020.15 ± 0.84 μmol·kg^{-1} (12)
Total alkalinity		*not certified, but expected to be stable*
Phosphate	0.46 μmol·kg^{-1}	
Nitrate	0.11 μmol·kg^{-1}	
Nitrite	0.02 μmol·kg^{-1}	
Silicate	8.99 μmol·kg^{-1}	

The cited uncertainties represent the standard deviation. Figures in parentheses are the number of analyses made. The nutrient levels may change on storage, their stability has not been examined; CO_2 analyses were performed over a period of time to confirm that the batch is stable.

The 95% confidence limits for the mean of these certified analyses are thus:

Total dissolved inorganic carbon	2020.15 ± 0.53 μmol·kg^{-1}
Total alkalinity	*not certified*

STORAGE: The bottles should be stored out of direct sunlight, and preferably at or below room temperature (25 °C). They should not be allowed to freeze!

Andrew Dickson

Andrew G. Dickson

Analytical Methods Used

Salinity

The salinity was determined by measuring its conductivity ratio relative to IAPSO Standard Sea Water using a Hytech Model 6220 inductive salinometer. This procedure has been described by J. Wyllie (1965) MLRG Salinity manual for the determination of sea water salinity by inductive salinometer, Marine Life Research Group, Scripps Institution of Oceanography.

Total dissolved inorganic carbon

The total dissolved inorganic carbon was assayed in Dr. C. D. Keeling's laboratory at the Scripps Institution of Oceanography by the vacuum extraction / manometric procedure. The weighed sample is acidified with phosphoric acid; the CO_2 evolved is then extracted under vacuum and condensed in a trap cooled by liquid nitrogen. The water and CO_2 are separated from one another by sublimation and the CO_2 is transferred into a mercury column manometer. There its pressure, volume and temperature are measured and the amount of CO_2 separated is computed from the virial equation of state.

Alkalinity

A reference procedure for alkalinity is under development in my laboratory.

Nutrients

Nutrient levels were determined by standard manual colorimetric techniques. The procedures are similar to those described in Parsons T. R., Y. Maita & C. M. Lalli (1984) *A manual of chemical and biological methods for seawater analysis*, Pergamon Press, Oxford, 173 pp.