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The carbonic acid system: Nature's universal buffer that does
more than just regulating the pH of water.

The bicarbonate/CO₂ buffer, is the universal buffer in Nature controlling the pH of Earth oceans as well as the pH of the blood in living organisms. Carbonic acid, an essential part of the CO₂/bicarbonate buffer system, had been for many years an elusive chemical species due to its instability in aqueous solutions. The chemical instability of carbonic acid, H₂CO₃, results in the molecule breaking down into CO₂ and H₂O, a reaction which is catalyzed by water. Various experiments in the past 10 years have shown that carbonic acid may be isolated intact and that the molecule is stable enough to be considered for its own chemical reactivity. Recently¹, using ultrafast mid-IR spectroscopy we have been able to directly measure the IR spectrum of carbonic acid and to evaluate its acid-base properties in aqueous solutions. Our findings open up the discussion of the role of carbonic acid in nature as well as pose a fundamental question: Have we missed a key element in the chemical and biological reactivity of water when interacting with earth atmosphere or when serving as the basic biological fluid?

1. Katrin Adamczyk, Mirabelle Prémont-Schwarz, Dina Pines, Ehud Pines and Erik T. J. Nibbering.

Real-time observation of carbonic acid formation in aqueous solution, *Science*, 326 (2009) 1690; published on line: *SciencExpress* 12/11/09.