

Interactive comment on "Technical Note: A simple method for vaterite precipitation in isotopic equilibrium: implications for bulk and clumped isotope analysis" by T. Kluge and C. M. John

R. Gabitov (Referee)

rinat.gabitov@gmail.com

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The manuscript submitted to Biogeosciences entitled: "Technical Note: A simple method for vaterite precipitation in isotopic equilibrium: implications for bulk and clumped isotope analysis" by T. Kluge and C. M. John is focused on experimental method for vaterite precipitation and isotopic fractionation between CaCO3 and fluid. Vaterite precipitation is often biologically controlled, and therefore, this work is within the scope of Biogeosciences journal. The precipitation method is somewhat similar to those used by Kim and O'Neil (1997) and it is addressed in the text. The most important conclusion is clumped isotope signatures in vaterite are undistinguishable from D47 in

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calcite. The same conclusion would be valid for d18O if authors could present d18O values for fluids. Abstract and title reflect the content of the paper. The only problem is disequilibrium isotopic fractionation could occur because of the lack of knowledge on vaterite precipitation rate. I think the paper is generally well written and language is fluent. I suggest accepting this manuscript for publication after minor revision. Please see my comments and concerns below and additional notes in the attached pdf file.

Authors suggested achievement of isotopic equilibrium between water and carbonate aqueous species. However the discussion on kinetic aspects of fractionation at mineral surface is too short. My understanding that vaterite growth rate was not evaluated in those experiments and authors consider that Kim and O'Neil (1997) data represent equilibrium fractionation. There was further research on this subject which demonstrated that slow growing calcite could be enriched in oxygen-18 by up to 2 permil (e.g. Coplen 2007; Gabitov et al 2012). Therefore, I would hesitate to state that vaterite precipitation occurred at isotopic equilibrium in this work (especially in the title). The authors may see Watkins et al. (2014) for comparison of fractionation factors from different experiments. Also, it would be very helpful if fractionation factors [1000ln(alpha18O)] are plotted instead of delta values because a lot of experimental data are reported this way and it will be easier to compare different datasets. Authors did not analyze experimental fluids for d18O, but used d18O of surface and ground water values of the London Metropolitan area from (Darling, 2003). I think it is important to measure d18O in the solutions from which vaterite precipitated to confirm the value reported by Darling (2003).

Rinat Gabitov

Please also note the supplement to this comment: http://www.biogeosciences-discuss.net/11/C7665/2014/bgd-11-C7665-2014supplement.pdf Interactive comment on Biogeosciences Discuss., 11, 17361, 2014.

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