Clim. Past Discuss., 7, C603–C608, 2011
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Climate of the Past Discussions

Interactive comment on "Boron isotope fractionation during brucite deposition from artificial seawater" *by* J. Xiao et al.

J. Xiao et al.

xiaojun@ieecas.cn

Received and published: 23 May 2011

Dear reviewer, Thank you for your letter and constructive comments concerning our manuscript entitled "Boron isotope fractionation during brucite deposition from artificial seawater". We have studied your comments carefully and made major correction which we hope meet with your approval. We answer your questions or comments in details in the following texts. Detailed answer to review: 1. Page 891, line 24: word use, confected; Reply: This sentence has revised to "A suspended graphite solution was prepared using spectrum pure (SP) graphite mixed with 802. Change word Page 891, line 12: website reference should be removed and described Page 892, line 810: word use, encountered; Reply: The website reference has been removed. Encountered was deleted and the sentence "One was encountered filtration by pumping immediately to

isolate deposit from solution (defined as a repose time Tr = 0 h) and the other was encountered filtration by pumping after reposing for 20 h (defined as a repose time Tr = 20 h)." has been revised to "One was filtrated by pumping immediately to isolate deposit from solution (defined as a repose time Tr = 0 h) and the other was filtrated by pumping after reposing for 20 h (defined as a repose time Tr = 20 h)." 3. Change word Page 890-893: describe X-ray diffraction equipment and methods. Reply: the X-ray diffraction equipment and methods are added in our paper (2.1 Reagents and equipment). 4. Page 895, line 3: word use, showed; correct to shown. Reply: the word "showed" was corrected to "shown". The sentence "The results are showed as follows:. . ." has been revised to "The results are shown as follows:...". 5. Page 896, line 4: word use, reach; correct to reaches. Reply: the word "reach" was corrected to "reaches". The sentence "The Kd also reach its highest at pH10." Has been revised to "The Kd also reaches its highest at pH10.". 6. Page 896, line 10: word removal; word is. Reply: word "is" was removed. Sentence of "In the study of Xu and Ye (1997), the point of zero charge (PZC) of brucite is close to 11.9, which is approximates to the inflexion point (pH 12) in our experiment." has been revised to "In the study of Xu and Ye (1997), the point of zero charge (PZC) of brucite is close to 11.9, which approximates to the inflexion point (pH 12) in our experiment.". 7. Page 897, line 12: word change; at to as. Reply: the word "at" was corrected to "as". The sentence "A minor difference between Tr = 0 h and Tr = 20 h appears at the pH increases from 9.5 to 10.0." has been corrected to "A minor difference between Tr = 0 h and Tr = 20 h appears as the pH increases from 9.5 to 10.0.". 8. Page 898, line 7: word choice; impossible to improbable Reply: the word "impossible" was corrected to "improbable". The sentence "Moreover a situation in which ïĄď11Bd>ïĄď11Bisw3 would be even more impossible." Has been revised to "Moreover a situation in which ïĄď11Bd>ïĄď11Bisw3 would be even more improbable.". 9. Figure 7 and 8: Axes not labeled consistently, curve difference pattern inconsistent, not described in methods. Regarding Figure 7: General concern due to limited crystalinity in sub-figures b and c. Lack of crystalinity is acceptable at crossover of speciation. Potential for amorphicity as exhibited in sample c could be misleading

in case of incorporation potential. Figure 7 and 8 lead to general concern of inclusion of mineral,besides intended mineral constituent. ReplyïijŽThe purpose of XRD figure in our paper is to verify the incorporation of B(OH)3 into Mg(OH)2. If only adsorption exists in our experiments, only B(OH)4- was adsorbed by Mg(OH)2. But results of our experiments indicated that B(OH)3 also incorporated into Mg(OH)2. In order to verify the incorporation of B(OH)3 into Mg(OH)2, the XRD experiments of Mg(OH)2 have been done. Our results did confirm that there are B(OH)3 existence in Mg(OH)2. But XRD is just a qualitative result. The XRD of our samples are used mainly to examine whether there are existence of pinnoite (Mg(BO2)2âĂć3H2O). Inclusion of mineral may exist in our samples, but the fluid inclusions in brucite deposit were not detected by SEM, and whether it can affect our results needs further research. Figure 7 and 8 was drawn again, and the Y-axes were labeled consistently. The new Figures of them are shown as follows: Fig. 7. X-Ray diffractogram of brucite deposited from artificial seawater at different pH values. (a) XRD of brucite standard, (b) XRD of brucite from boron-free artificial seawater at pH 10.0, (c-h) XRD of brucite in our experiments. The brucite peak in our samples is clear compared with brucite standard (Fig. 7a).

Fig. 8. X-Ray diffractogram of brucite deposited from B-containing artificial seawater at pH 9.5. It is a magnified figure of Fig. 7c. Compared with Fig. 7b, the brucite peak in Fig. 8 is clear, with apparent peaks of pinnoite (Mg(BO2)2âĂć3H2O) and szaibelyite (MgBO2(OH)). Judged from quantity and intensity of these peaks, pinnoite content should be higher than that of szaibelyite. As pH increases, the borate peak gradually weakens (Fig. 7c-h). When pH is 12.5 (Fig. 7h), its peak is very close to that of Mg(OH)2 standard (Fig. 7a), though the characteristic pinnoite peak is still observed. We really hope theses modification can meet with your approval. Thank you very much. Yours Sincerely, Jun Xiao 5/20/2011

Please also note the supplement to this comment:
http://www.clim-past-discuss.net/7/C603/2011/cpd-7-C603-2011-supplement.pdf

Interactive comment on Clim. Past Discuss., 7, 887, 2011.

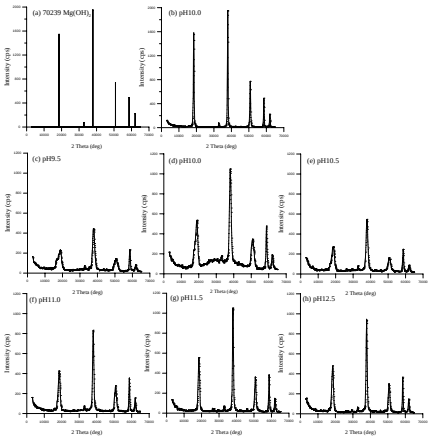

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Fig. 1.

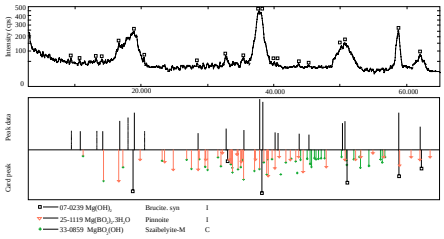

Fig. 8. X-Ray diffractogram of brucite deposited from B-containing artificial seawater at pH 9.5. It is a magnified figure of Fig. 7c. Compared with Fig. 7b, the brucite peak in Fig. 8 is clear, with apparent peaks of pinnoite ($Mg(BO_2)_2{\cdot}3H_2O$) and szaibelyite ($MgBO_2(OH)$). Judged from quantity and intensity of these peaks, pinnoite content should be higher than that of szaibelyite. As pH increases, the borate peak gradually weakens (Fig. 7c-h). When pH is 12.5 (Fig. 7h), its peak is very close to that of $Mg(OH)_2$ standard (Fig. 7a), though the characteristic pinnoite peak is still observed.

Fig. 2.