

Biogeosciences Discuss., referee comment RC1
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Comment on bg-2021-134

Anonymous Referee #1

Referee comment on "Comparing CLE-AdCSV applications using SA and TAC to determine the Fe-binding characteristics of model ligands in seawater" by Loes J. A. Gerringa et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-134-RC1>, 2021

General comment

In this manuscript, three CLE-ACSV methods (TAC, SA5, SA25) for analyzing the concentration and conditional stability constants of organic Fe-binding ligands using several model ligands (DTPA, phytic acid, desferrioxamine B, ferrichrome, ferrioxamine E, vibriobactin, FA and HA). It is notable that not only comparing the analysis results from the CLE-ACSV titrations, but also this manuscript investigates and discusses the differences in the characteristics of the competing ligands SA and TAC and differences in analytical instruments. Although these points have been pointed out as possibilities for some time, there are few studies that discuss their effects based on the actual measured value. In the Conclusion, it is suggested that future studies of organic Fe-binding ligands in seawater requires alternatives to the current CLE-ACSV method, and I agree. Although the model ligands used in this manuscript are just "model" and can be considered different from the natural ligands in the ocean, understanding the characteristics of each CLE-ACSV method was exactly what was needed for research in this area. In addition to this, I am interested in the influence of the results on the multiple analytical windows method. In recent years, a multiple analytical windows technique with SA has been applied to determine the multiple classes of Fe-binding ligands in seawater (e.g., Bundy et al., 2014, which has been refereed in this manuscript). How do you think about the influence of these results on the evaluation of multiple analytical window method?

Overall, this manuscript is organized and well-written. I believe that this manuscript is going to have a strong influence on the development of research in this area. After responding to the following minor comments, I think this manuscript can be accepted.

Minor comments

Line 17. Fe₃⁺ should be Fe³⁺

Line 125~160. The "Langmuir isotherm assumption" is often mentioned in this manuscript and the outline of the assumption itself is explained. However, as shown in Line

163(...assumption 2 or 6), for example, it is not clear from this manuscript alone what each assumption number refers to, so please indicate it in the text after Line 132.

Line 185~. Please indicate the temperature conditions of the samples during equilibration period for each experiment in the main text.

Line 227. Please show the reference information of the UV irradiation for the past experiments related to Co and Cu ligand analyses.

Line 331~. The explanations of the In-cell experiments and bottle experiments are complicated to understand for people outside the field, so I thought it would be nice to have a schematic diagram as a supplementary figure.

Line 385. "Using Eqs. (1) and (3) give"

Figure 1. Please add [A] – [H] in each figure.

In figure [H], the HA concentration is 1 mg and 2 mg in the legend, so please correct it.

Line 434. Since the standard deviation can be shown with 3 or more data. If the number of data is 2, strictly speaking, the difference from the average value is the correct notation.

Figure 2. I sometimes suffered from distinguishing the color patterns in these figures. Could you change the color so that it can be easily distinguished in each series?

Line 449-450. 2A and C?

K^{cond} can be written as K^{cond}

Line 461. sweater: Seawater?

Line 475. Please insert the unit for [L].

Line 481. There are 3 significant digits and 4 significant digits of log K, so it is better to unify them (only the 0 in the 4th digit disappears?). I think this can be said for the entire manuscript and tables. Or is it due to a difference in method (TAC or SA)?

Line 489. Buck et al. (2007)?

Figure 6. The resolution of the figures is rough.