

## **Cr(VI) adsorption/desorption on untreated and mussel shell-treated soil materials:**

### **fractionation and effects of pH and chromium concentration**

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#### **General comments**

This paper describes an experimental approach to the study of Cr sorption/desorption kinetics for different soil materials and acidity. In my opinion, this manuscript falls within the scope of SE. The experiment is well designed, although not well explained. Also, there are some inconsistencies in the text that need deep revision and re-writing. Especially, statistical analysis is very poor. Simple statistics may be applied to the analysis of results, which will improve the interpretation of results and discussion.

In the objectives, it is stated that “risks of water pollution and transfer to the food chain” will be analyzed and discussed, but I have not found discussion on this. Just a short paragraph focused on this aspect should help to give the manuscript a wider scope, in agreement with the journal characteristics.

I consider that this manuscript should be of interest, but needs a lot of work (then, conclusions should be perhaps modified). It should be reconsidered after major revision.

#### **Detailed comments**

Pages and line numbers correspond to the discussion paper published in SED.

##### **Page 3394**

**Line 2** Here in after, I suggest using “sorption” instead of “adsorption”.

**Lines 22-23** You should add a reference supporting this statement. I suggest these:

- Alves et al. (1993), [http://dx.doi.org/10.1016/0043-1354\(93\)90220-C](http://dx.doi.org/10.1016/0043-1354(93)90220-C)
- Di et al. (2006), <http://dx.doi.org/10.1016/j.chemosphere.2004.06.044>

##### **Page 3395**

**Line 1** Substitute “has” with “have”.

**Line 2** Micoorganisms cannot be referred to as « materials ». Try to re-word this sentence.

**Line 5** Re-write: “at pH<2”.

**Line 6** Re-write: “when pH increased”.

**Lines 9-10** Re-write: “Globally, it is necessary to increase the knowledge on Cr(VI) retention processes by sorbent materials”.

**Line 18** Substitute “In view of that” with “Therefore”.

**Lines 18-25** Delete “firstly” and “secondly” (the order is shown by “a” and “b”).  
Re-write: “and, finally, (c)”.

##### **Page 3396**

A “Data analysis” section should be added. This should include:

- Checking the normal distribution of data.
- After the normal distribution hypothesis is accepted/rejected, description of the correlation statistic used (Pearson/Spearman).

- Fitting to Freundlich and Langmuir models.

Part of this is included in the first lines of page 3398, and should be moved to the new section.

- Lines 3-20** I suggest adding a table with materials used and simplify the text.
- Lines 3-7** Was this similar-to-a-C-horizon material sampled as is or were the upper horizons previously removed?
- Lines 17-20** Not clear to me. Was the zig-zag sampled material used to form a composite sample? Please, check this paragraph.
- Line 25** Total or organic C and N?  
Even native English speakers have problems with this, but, in the future, “relationship” is for people and “relation” is for things. However, in this case, delete “relationship” or substitute it with “ratio”.

**Page 3397**

- Lines 18-20** Repeated text? Again, I suggest using a table and simply citing it here if necessary.

**Page 3398**

- Line 12** “After the ending...” sounds strange. Please, re-write.
- Lines 14-15** Here and in page 3399, check: “shaking”, “centrifuging” and “filtering”. Please, re-write.
- Lines 17-19** Repeated again. Check!
- Line 18** Although tonnes (t) and hectares (ha) are not part of the Int. System of Units, they are widely used. But just as a suggestion, much better if you use “Mg” instead of “t” and “m<sup>2</sup>” instead of “ha<sup>1</sup>”. So, 12 t ha<sup>-1</sup> should be written as 1.2 kg m<sup>-2</sup>.  
Please, insert a space between t and ha<sup>-1</sup>.

**Page 3399**

- Lines 15-17** Materials repeated again.
- Line 18** The mentioned “slight decrease” is not very clear in absence of statistical analysis.
- Line 21** Re-write: “acid-soluble”

**Page 3400**

- Line 9** No function in the figure.  
Re-write: “...increased with Cr(VI) concentration...”.
- Lines 5-6** Re-write: “(60, 17 and 23%, respectively); forest soil (65, 20 and 15%); mussel shell (99.53, 0.34 and 0.13 %); pyritic material (67, 14 and 19 %)”.  
However, this is not a full characterization of solid materials used. Just texture, so, the head title should be changed. As data ARE INCLUDED in Table 1, I suggest re-writing this paragraph and just describing (not simply listing numbers) textures.
- Line 18** Re-write: “1.2 kg m<sup>-2</sup>”.
- Line 24 and following** What does “significant” means? First, you should have included data analysis in methods. Second, tell us what p-values do these correlation coefficients have.

**Page 3402**

- Lines 7-13** Not clear at all. I do not know what this means. This discussion needs more detailed description.

**Page 3403**

- Lines 6-7** Delete “In the present study”. Re-write: “The pyritic material showed the maximum Cr(VI) adsorption”.  
99% of what?
- Lines 9-13** Percentages of what?

**Page 3404**

- Line 4** Check these values.
- Line 13** Strongly? In line 8 you wrote “this anion adsorbs strongly both...”. This looks correct, but not in line 13. I think you mean that a large amount of Cr(VI) was retained, not “strongly” retained, as you have no evidence to say that. Check also the following 2-3 lines.
- Line 15** Re-write: “indicated”.
- Line 16** Re-write: “facilitates”.
- Line 17** Signal?

**Tables** Just as a suggestion, it should be better if you move footlines to captions in tables 1 and 3.

**Table 1** Check decimal places! Texture of mussel shell is shown with 2 decimal places, the rest are round values. Also there are some other inconsistencies through the table (eg, Al<sub>p</sub>, Al<sub>op</sub>, Al<sub>cu</sub>...)

**Table 2** Delete “(dimensionless)”.  
Add a third decimal place in the third column, second row.  
Should you add p-value of correlation coefficients or state it in the table caption.

**Table 3** In the caption: percentage of what?  
Use the same number of decimal places in all percentages.  
Move the footline to the caption (are abbreviations necessary, however? I strongly suggest using the full forms).

**Figures** Why not color figures? It will gain dissemination (and citations).  
Some parts of the discussion and conclusions are not supported by figures. I suggest a more deep statistical analysis of results.

**Figures 1-3** I think these figures should gain if displayed as a 2x2 matrix, instead of one column. Also, font used is too small.

**Figure 1** No curves here! Regression curves should be added, as stated in the caption. If representing only points, why not all (three replicates, according to the main text) and not only mean values (I suppose mean values are displayed, but not explained in the caption).  
Why granitic material is displayed in b) and c)? Again: why not regression curves in ONE ONLY graph?

**Figure 2** See comments above.

**Figure 3** “As a function”? You should add regression curves or re-write the caption (“relation between desorbed Cr(VI) (%) and pH for...”).  
“Fine shell”?

**Figure 4** Delete “24 h”, “1 week” and “1 month” in the figure (it is explained in the caption). Check: the same legend is repeated three times.

