Manuscript review – “Pilot study of nitrogen removal from landfill leachate by stable nitritation-denitrification based on zeolite biological aerated filter”

**General Comments:**

* Overall, the paper is very interesting and could prove to be a useful new method for treating landfill leachate. A few points that I think need to be addressed:

1. In the introduction (lines 33-35) the authors describe one of the main purposes for this research is to identify a more economically feasible option for ammonia and organic matter. It is proposed that with lower energy consumption and less carbon dosing a more economical option may be viable. However, on lines 246-248 the authors completely contradict this purpose by saying that their method may still require additional carbon dosing which would then potentially not serve one of the main purposed for the switch in treatment methods. The authors should consider providing some kind of cost assessment if they plan to use the economic benefits as a primary motivation for changing treatment processes.
2. Throughout the results section, there is a lot of discussion about how the HRT changing has a dramatic effect on ALR, NPR, NAR. However, the reflux rate changes at the same time as the HRT. While it is entirely possible that HRT was governing these changes, it is hard to say definitively given the fact that both of these factors were changing simultaneously.
3. Lines 216-220, the authors make the conclusion that as reflux ratio is decreased in the latter stages of the study that this resulted in a decrease in TN removal. However, how can the authors be sure that this is occurring due to the decrease in reflux ratio and not simply be a result of increased filter run time. In traditional filters, filter run time is a driving cause in decreased removal efficiency and that seems to be true for the ZBAT in my opinion.

* In my opinion, while the ammonia removal is telling an interesting story and showing the process accomplishes its goal, I think the main thing differentiating this process from conventional process that are mentioned in this paper is the analysis of the microbiological community, specifically the demonstration that AOB is more abundant in the ZBAF process and that NOB is not present at a detectable level in the ZBAF, both of which were in contrast with the conventional process used for comparison.

**Specific Comments:**

* Several places throughout the manuscript organic matter is referred to as “organic matters” and this should be corrected
* Line 38: ANAMMOX instead of ANNMMOX
* Lines 49: “free ammonia inhibition (FA)” – this is confusing. It makes it appear as the FA means free ammonia inhibition rather than simply free ammonia (which I believe is the author’s intention – see lines 60-61). This should be changed to “Free Ammonia (FA) inhibition”
* Lines 55-56: “…when DO is out of controlled” should be “when DO is out of control”
* Line 63: “… FA concentration is hard to be stable” should be “…FA concentration is hard to keep stable
* Line 70: “Bases…” should be “Based..”
* Line 71: “…biofilm carrier may be highly potential for keeping appropriate FA…” – this sentence is pretty awkward. Should be reworded. Maybe “…biofilm carrier has the potential for maintaining FA levels…”
* Lines 73: “In the literature,” should be removed
* Line 94: “Both of the influent…” should be “Both the influent..”
* Line 117: “firstly” should be “first”
* Lines 118: “nearly half a month” – what does this mean? The authors should be explicit as to how many days the biofilm was allowed to cultivate.
* Lines 119-120: “….stepwise by 30, 35 ,38, and 40 L/h…” – this wording makes it seem like you increased the inflow rate by these amounts rather than increasing the *to* these values. Suggest changing the “by” to “to”
* Lines 123: remove the comma
* Lines 141-142: The equations for ALR and NPR are *exactly* the same
* Line 145: “Excitation emission matrix spectrometer (EEMs)” – this is similar to the FA abbreviation. This should (it seems to me) be changed to “Excitation Emission Matrix (EEMs) spectrometer
* Lines 156-157: region IV and region V are exactly the same
* Line 205: Fig. 1 should be Fig. 2
* Line 207: Fig 1a should be Fig 2a
* Line 208: “2600 and 3300 mg/L” should be “2600 and 3300 mg/L, respectively”
* Line 213: Fig. 1b should be Fig. 2b
* Line 214: “NH4-N basically stayed stably at about..” – this awkward. Suggest rewording it to “NH4-N stayed stable at…”. The authors use of “basically” and “about” makes it seem as though they are not sure about the results.
* Line 226: Fig 2 should be Fig 3
* Line 229: “Dramatically, remarkable…” – the combination of these words seems awkward. Suggest choosing either “Dramatic” or “Remarkable”
* Line 231: “…this reactor did played a key..” should be “…this reactor played a key…”
* Line 232: “…buffer tank along with the whole experimental period.” – this is awkward wording should change it to “…buffer tank during the entire experimental period”
* Line 233: “Both of the decrease of…” should be “The decrease in both..”
* Line 234: “demonstrated that actually portion of…” should be “demonstrated that a portion of…”
* Line 237: Fig 2(d) should be Fig 3(d)
* Line 241: Fig 2 should be Fig 3
* Line 258 and 259: both “dramatically” and “apparently” should be removed
* Line 324: the authors use the word “significantly”. It would seem that this is used in a similar manner to “dramatically” and “apparently”. However, the word “significant” is mostly used in association with statistical tests that show statistical significance. This should be removed unless statistical results can be provided to back up its use
* Line 338: “the noteworthy relative abundance increase of Proteobacteria…” – if this is referring to changes in relative abundance between Z1, Z2, Z3, Z4 then this statement contradicts the numbers given on the line before that shows Protebacteria decreasing in relative abundance with each sample.
* Lines 368-371: Again the authors make the conclusion that their treatment process will “definitely change” a landfills operational cost situation because of reduced carbon dosing and aeration costs except the author’s process also includes aeration *and* (as mentioned in the general comments) could require carbon dosing in the same situations that conventional treatment would require carbon dosing
* Line 385: “NPR were basically higher..” – were they or weren’t they? The basically should be removed if they were
* Fig 7 – the caption says the figure 7b shows the Family level in one sentence and then says it shows the class level. When referenced in the text of the manuscript, it refers to it as the class level. This discrepancy should be rectified. In addition, this figure is very hard to read in its current size, I am not sure whether this will be enlarged when published but the figures should be made larger so that the legend text is readable.