Atmospheric Measurement Techniques Discussions

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Comment on amt-2021-72

Anonymous Referee #2

Referee comment on "A method for liquid spectrophotometric measurement of total and water-soluble iron and copper in ambient aerosols" by Yuhan Yang et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-72-RC2, 2021

The manuscript needs a major revision. I think a high-throughput technique to measure Cu and Fe in PM 2.5 will definitely contribute to the atmospheric research community. However, I do have a few concerns regarding the methodology part of this manuscript, for which I suggest a major revision before acceptance.

PM2.5 is very heterogeneous in terms of elemental composition. You must consider the effect of other co-occuring elements when you are using a colorimetric method to measure a specific component (e.g. Cu or Fe). When multiple metal elements (such as Fe, Cu, Ni, Mn , Al and Co) are present at similarly high concentrations) simultaneously, is your colorimetric method still valid to measure Fe or Cu alone without being affected by other co-occuring elements? I saw you measured Mn, but your Mn concentration is very low, which would not interfere your results. But what is the threshold concentration of Mn and other transitional elements in air that makes your colorimeteic method invalid? In addition, it is commonly observed that PM2.5 can contain a high level of both Cu and Fe. If we are interested in measuring both Cu and Fe, is your method able to separate Cu and Fe in concentration measurement? Does a high Cu or Fe concentartion affect the measurement of the other? What will be the detection limit when you have them co-occuring?

I did not see enough negative control and positive control groups. I suggest you include following controls, to make your work useful for the whole atmosphere research community.

1) Positive controls should be done to validate the colorimetric method for Cu and Fe. For example, if you have 100 ppb of Fe (II) with 100 ppb of WS Cu, 100 ppb WS Mn , 100 ppb WS Ni and 100 ppb WS Co, will your ferrozine exclude other co-occuring these other elements and accurately measure e (II)?

2) Similarly you need negative control groups as well. For example, if you have 0 ppb of Fe (II) with 100 ppb of WS Cu, 100 ppb WS Mn , 100 ppb WS Ni and 100 ppb WS Co, will your ferrozine method exclude other co-occuring these other elements and show the absence of Fe (II) ?

You need these control groups for ferrozine-Fe method and bathocuproine-Cu method. The discussion of artifacts due to effects of other elements is very important, because it informs other air researchers when your method is applicable.