General Comments:

Water soluble inorganic ions (WSII) including both anions and cations are one of the most important components identified in atmospheric aerosols. Quite number of methods are available to quantify airborne WSII in aerosols. This manuscript mainly reported an inter-laboratory comparison of WSII measurements followed by the discussion of its implication on aerosol pH estimation. In all, most parts of this manuscript have been well written, and can be certainly considered for the publication in AMT. However, the present manuscript contains some minor omissions and mistakes, which need modification. So, I recommend a minor revision prior to the consideration of acceptance.

Specific comments:

1. In Section 2, more experimental details should be given so that the possible reasons for the data difference between different labs can be evaluated. For example, how the purity of the ultrapure water in each lab was assured? What type of syringe filter (Teflon, Nylon or others?) is employed to filtrate the extract prior to analysis? What types of vial (e.g., glass or PTFE vial?) was used for analysis (glass vial may bring Na^+ contamination)? What model/what power of ultrasonicator is used during the extraction? Are they consistent in all labs? These experimental procedures may be important for the data accuracy and resulting in the data difference. Those details would be helpful for the discussion of the potential reasons for the inconsistency; it is also useful for those who are setting up the protocol to conduct proper analysis of ionic species in aerosol. So, I suggest the authors try to include those details if available.

2. This study showed a similar trend of aerosol pH among the 10 labs and concluded that although there is large variation in aerosol ion concentration measurements, the estimated aerosol pH from the ISORROPIA-II model is more consistent. However, the 10 labs actually shared the same set of gaseous NH_3 concentration, and it has been known that the concentration of gaseous NH_3 may be one of the most important components during the estimation of acidity. Therefore, the consistent aerosol pH may not reflect the uncertainty of measurement of other ionic species. I suggest the authors should also consider the measurement uncertainty of gaseous NH_3 concentration when comparing aerosol pH in different labs.

3. The authors may also consider showing the predicted gas-aerosol partitioning of NH_3 and comparing the results with the measurements in different labs. Compared to aerosol pH, the gas-aerosol partitioning may be a more sensitive parameter.

4. There are 5 days with pH > 7. Since the ISSORPIA-II is running in forward mode, pH>7 would require extremely high concentration of NH_3 in gaseous phase which is almost impossible for ambient air environment. Dr. Song Shaojie, one of the co-authors of this manuscript, has conducted a comprehensive analysis on the issue of pH in 2018 (Song et al., 2018). I would suggest the authors should double check their input parameters in ISORROPIA-II.

5. In lines 582-585, the authors attributed the large variation of ammonium measurement to the volatility of NH_3 and suggested to use fresh prepared standard solution. I agree with the

suggestion to use fresh prepared standard solution. However, I doubt the reason given by the authors. NH_3 (as molecular) are indeed volatile. However, in acid or neutral solution, NH_3 is mainly in the form of NH_4^+ which is not volatile. The authors may check the pH of the standard solution. I also suggest the authors to check the calibration curve of NH_4^+. Depending on the instrument, the calibration curve of NH_4^+ can be either linear or non-linear, which should be treated carefully and often causes large uncertainty.

6. Other minor issue:
   a) Line 206: The description may be misleading. In the forward mode of ISORROPIA-II, the total concentrations of gas + aerosol is fixed.
   b) Lines 229-230: I suggest the authors to show the result of water blanks to support their interpretation.
   c) Line 435: [F-/19] should be [F-/9]?

Reference

Song, S., Gao, M., Xu, W., Shao, J., Shi, G., Wang, S., Wang, Y., Sun, Y., and McElroy, M. B.: Fine-particle pH for Beijing winter haze as inferred from different thermodynamic equilibrium models, Atmos. Chem. Phys., 18, 7423–7438, https://doi.org/10.5194/acp-18-7423-2018, 2018.