

Interactive comment on “Impact of aerosol composition on cloud condensation nuclei activity” by Q. Zhang et al.

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Anonymous Referee #2 The manuscript provides the evaluation of aerosol composition on cloud condensation nuclei (CCN) activity based on a field experiment conducted at downtown Tianjin, China in September 2010. The severe air pollution in China, that is caused by rapid industrialization and urbanization, has attracted more scientific studies recently because of its potential impact on regional and global environment and climate. Characterization of CCN activity of aerosols based on measurements is necessary and important for the investigation of aerosol-cloud interaction, which has constituted the greatest uncertainty to global climate forcing. Therefore, the measurement provided in the manuscript is valuable, and the analysis of observation results is also reasonable. There is sufficient current interest in air pollution in China to war-

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rant publication of the manuscript in Atmospheric Chemistry and Physics. I have a few suggestions that the author should address prior to publication.

1)In summaries, add discussions about why the effect of aerosol composition on CCN activity decreases with the raising of SS. Reply: thanks for the valuable opinion of referee, we add the following sentence: The critical SS (S_c), which is the threshold SS for CCN activation, is affected by their composition. Only when environmental SS is higher than their S_c can the particles be activated. Based on Köhler theory, the S_c decreased with increasing particles solution. Therefore, the effect of aerosol composition on CCN activity is significant at low SS, and this effect decreased with the raising of SS. If the SS was set too high, most particles can be activated. This point was verified in our experiment.

2)In summaries, Point 2, I was confused about how to calculate the CCN concentrations without consideration of aerosol compositions. The authors need to clarify. Reply: the calculation of CCN concentration is introduced in the manuscript (equation(2), Page 9-10). The influence of aerosol composition on CCN is calculated by the different size resolved activation ratio under various compositions.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 1493, 2012.

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