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Formation of binary ion clusters from polar vapours: effect of the dipole-charge interaction

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Abstract. Formation of binary cluster ions from polar vapours is considered. The effect of vapour polarity on the size and composition of the critical clusters is investigated theoretically and a corrected version of classical Kelvin-Thomson theory of binary ion-induced nucleation is derived. The model predictions of the derived theory are compared to the results given by classical binary homogeneous nucleation theory and ion-induced nucleation theory. The calculations are performed in wide range of the ambient conditions for a system composed of sulfuric acid and water vapour. It is shown that dipole-charge interaction significantly decreases the size of the critical clusters, especially under the atmospheric conditions when the size of critical clusters is predicted to be small.

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