

HOMOGENEOUS AND HETEROGENEOUS NUCLEATION IN ISOLATED MICRO-DROPLETS: PHASE TRANSITION IN CRITICAL NUCLEI

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## ABSTRACT

A low temperature single suspended particle apparatus was used to study liquid-solid phase transitions in electrolyte solutions. We will present the results from a study of the nucleation of ammonium sulfate from its super-cooled/saturated water solutions at temperatures from 40°C to -30°C. The data indicate that there are two distinct nucleation mechanisms above and below 5°C. Between 40°C and 5°C the critical nucleus is comprised of 10 at 40°C and 7 at 5°C anhydrous ammonium sulfate unit cells. At 5°C the critical nucleus undergoes a phase change from anhydrous to tetrahydrate. This change in the critical nucleus phase is a result of a liquid-liquid structural change. The addition of a 50 nm solid calcium carbonate inclusion provides heterogeneous nucleation sites reducing the supersaturation required for nucleation. The barrier to heterogeneous nucleation and the size of the critical nucleus are much reduced as compared with the homogeneous case.