

THERMODYNAMIC PROPERTIES OF MULTICOMPONENT NUCLEI IN  
VAPOR-LIQUID NUCLEATION

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June 1998

72nd ACS Colloid & Surface Science Symposium  
Pennsylvania State University  
University Park, PA  
June 21-24, 1998

Research by BNL investigators was performed under the auspices of the U.S. Department of Energy under Contract No. DE-AC02-98CH10886.

## ABSTRACT

The Gibbs-Duhem relations are known to yield a fundamental equality between the derivative of the nucleation barrier height with respect to the chemical potential of vapor species, and the number of molecules in the critical nucleus (nucleation theorem). Here the Gibbs-Duhem relations are used to obtain new equalities for derivatives of the volume and Laplace pressure of multicomponent critical nuclei, and extension of the nucleation theorem to include the effects of chemical equilibria within the nucleus. The talk will discuss surface enrichment and curvature-dependence of the surface tension for binary and multicomponent nuclei. Application will be made to atmospheric particle formation through illustrative calculations for binary sulfuric acid-water nucleation and ternary sulfuric acid-water-X nucleation where X is either ammonia or nitric acid.