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THE LITTLE PARTICLE THAT COULD

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We report the first experiments on single suspended particles under stratospheric conditions. Our study of the phase transformations of the binary, $\text{H}_2\text{SO}_4/\text{H}_2\text{O}$ system at temperatures from 273 to 150K. shows that the isolated particles do not freeze even when held at the stratospheric frost point (193K) for over 24 hr. To form a solid phase they had to be cooled down to 166K at which point they form a crystal of composition $\text{H}_2\text{SO}_4 \cdot 8\text{H}_2\text{O}$. Upon warming these solid particles maintain constant composition all the way to 224K where they deliquesce to form a 37% solution. At no point, even after keeping the particle at 193K for over 4 days is the predicted $\text{H}_2\text{SO}_4 \cdot 4\text{H}_2\text{O}$ (SAT) observed. These experiments clearly demonstrate that results from bulk studies, with surfaces present, cannot be used to predict aerosol behavior.