
Surface chemistry data for extrasolar cloud formation modelling

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Résumé

Brown dwarfs and extrasolar atmospheres are forming clouds that can be very different from clouds on solar system planets. Recent observational efforts point to the need of a more fundamental modelling beyond the widely used S=1-ansatz. We have therefore developed a cloud formation model that treats

- seed formation (nucleation) via the formation of larger and larger clusters,
- growth/evaporation through gas-solid surface reactions
- element conservation
- gravitational settling,

allowing for a detailed modelling of material composition, cloud particles sizes and number of particles.

While cluster data for nucleation modelling (seed formation) can be obtained via computational chemistry methods, material data required to model the surface growth, like reaction efficiencies for individual surface reactions, are sparsely available. I will demonstrate the impact of data uncertainties on cloud properties like grains size and number. Recent developments in charge and discharge processes in ultra-cool atmosphere that might influence the cloud particle population, their chemistry as well as the gas-phase chemistry will be discussed.

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