

CONSTRAINTS ON THE SALINITY OF ENCELADUS' PLUMES

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We report on a search for sodium emission from the vicinity of Enceladus as a strong constraint on the potential salinity of the plumes. While the dominant plume constituent is H₂O, the presence or absence of trace constituents may help decide between models of the plume origin. Sodium is an important first test since it is readily detectable and cosmically abundant. Salts may also be enhanced if Enceladus has subsurface liquid water in contact with rocky material. We will present the results of recent high-resolution spectroscopic observations using the Keck and Anglo-Australian Telescopes. We will also discuss two critical theoretical considerations: the efficiency with which trace elements are incorporated in the plumes, and the efficiency with which sodium is later liberated in atomic (and therefore observable) form. Taken together, the observations and theory will place useful limits on plume composition, and potentially their origin.

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