

TRACING THE HISTORY OF TABLE SALT

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Sodium chloride, NaCl, is an essential molecule for life. Its presence in circumstellar envelopes of evolved stars, protoplanetary disks, and asteroids is highly surprising. Furthermore, it has two abundant isotopologues, Na³⁵Cl and Na³⁷Cl, and the chlorine isotopic ratio can be used to trace its chemical history. NaCl has been a known constituent of both the carbon star IRC+10216 and the oxygen-rich supergiant VY CMa, as was evident in a previous ARO 1 mm spectral survey of these objects. Recently, we have also detected this molecule in the supergiant NML Cygnus. Using the radiative transport code ESCAPADE, we have modeled multiple transitions of both Na³⁵Cl and Na³⁷Cl detected in the envelopes of IRC+10216, VY CMa, and NML Cyg. Surprisingly, the abundance of NaCl is similar in all three envelopes, with a fractional abundance of 10^{-9} relative to H₂, with a ³⁵Cl/³⁷Cl of approximately 3/1. The implications of these results will be discussed.