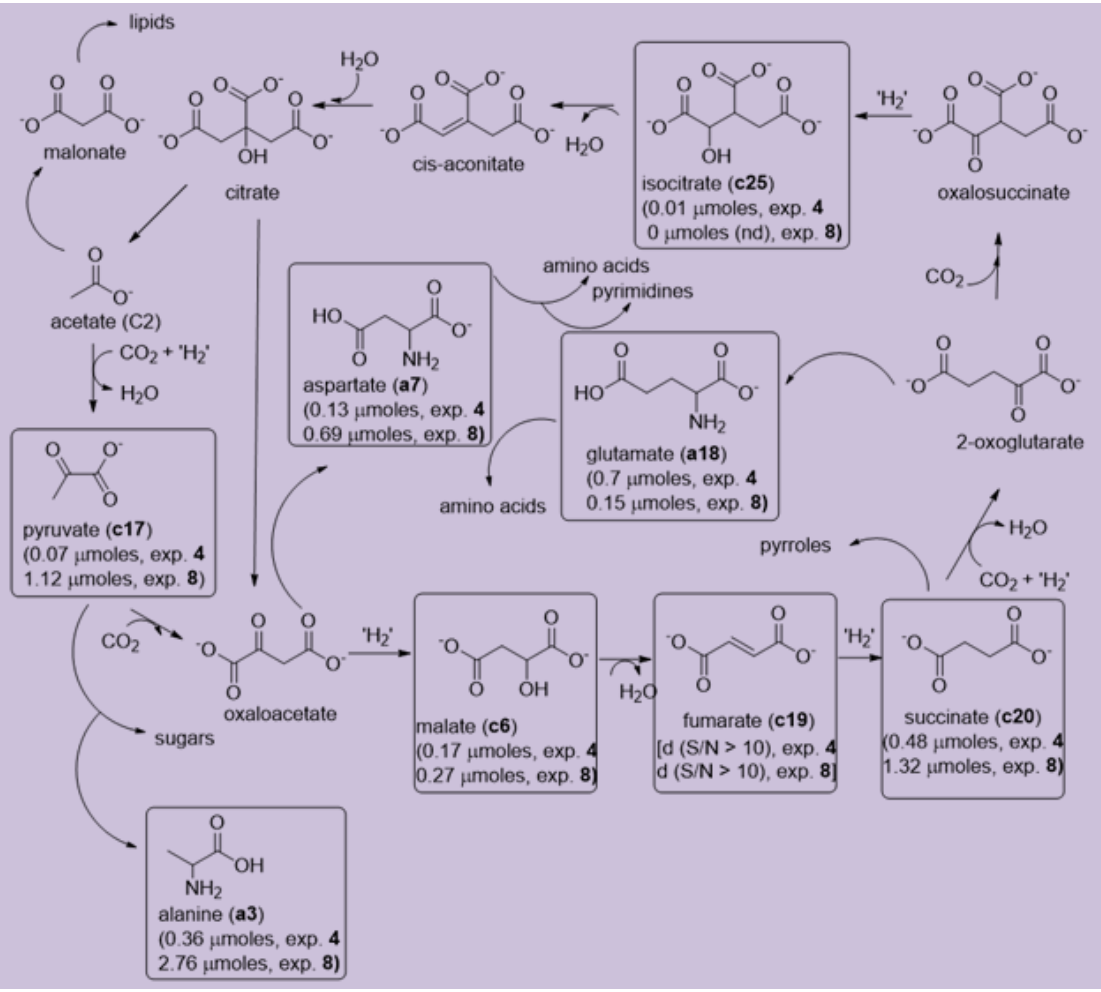
Prebiotic chemistry in neutral/ reduced-alkaline gas-liquid interfaces



Reductive tricarboxylic acid cycle (rTCAC) (adapted from Guzman and Martin). In boxes the components of this cycle identified in hydrophilic, which used alkaline aqueous aerosols are marked. The µmoles for the carboxylic acids were calculated using the multiple point external standard method, and µmoles of amino acids were semiquantitative calculated from the peak of glycine. For the quantification of glycine, a multiple point external standard method was used.

The conditions for the potential abiotic formation of organic compounds from inorganic precursors have great implications for our understanding of the origin of life on Earth and for its possible detection in other environments of the Solar System. It is known that aerosol-interfaces are effective at enhancing prebiotic chemical reactions, but the roles of salinity and pH have been poorly investigated to date. Here, we experimentally demonstrate the uniqueness of alkaline aerosols as prebiotic reactors that produce an undifferentiated accumulation of a variety of multi carbon biomolecules resulting from high-energy processes (in our case, electrical discharges). Using simulation experiments, we demonstrate that the detection of important biomolecules in *tholins* increases when plausible and particular local planetary environmental conditions are simulated. A greater diversity in amino acids, carboxylic acids, N-heterocycles, and ketoacids, such as glyoxylic and pyruvic acid, was identified in *tholins* synthetized from reduced and neutral atmospheres in the presence of alkaline aqueous aerosols than that from the same atmospheres but using neutral or acidic aqueous aerosols.

MOMPEÁN ET AL. *SCI. REPORTS* **2019**, *9*, 1916. DOI.ORG/10.1038/S41598-018-36579-7.
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