Recent Selected Ion Flow Tube (SIFT) Studies Concerning the Formation of Amino Acids in the Gas Phase

Douglas M. Jackson* Nigel G. Adams*
Lucia M. Babcock* ...

February 3, 2006

Abstract

Recently the simplest amino acid, glycine, has been detected in interstellar clouds, ISC, although this has since been contested. In order to substantiate either of these possibilities, plausible routes to amino acids need to be investigated. For gas phase synthesis, the SIFT technique has been employed to study simple amino acids via ion-molecule reactions of several ions of interstellar interest with methylamine, ethylamine, formic acid, acetic acid, and methyl formate. Carboxylic acid type ions were considered in the reactions involving the amines. In reactions where the carboxylic acid and methyl formate neutrals were studied, the reactant ions were primarily amine ion fragments. It was observed that the amines and acids preferentially fragment or accept a proton whenever energetically possible. NH3+, however, uniquely reacted with the neutrals via atom abstraction to form NH4+. These studies yielded a body of data relevant to astrochemistry supplementing the available literature. However, the search for gas phase routes to amino acids using conventional molecules has been frustrated. Our most recent research investigates the possibility that ion-molecule reactions of acrolein and ethylene oxide may lead to amino acid precursors.

*University of Georgia, Cedar Street, Athens, GA 30602 Fax: 706-542-9454 Tel: 706-247-3722