

## Accepted Manuscript

Thio Residue from Thermal Processing of Cometary Ices Containing Carbon disulfide and Ammonia

Rabin Rajan J. Methikkalam, S. Pavithraa, S.P. Murali Babu, H. Hill, Raja Sekhar, T. Pradeep, B. Sivaraman

PII: S0273-1177(16)30163-6  
DOI: <http://dx.doi.org/10.1016/j.asr.2016.04.028>  
Reference: JASR 12713

To appear in: *Advances in Space Research*

Received Date: 23 January 2016  
Revised Date: 10 April 2016  
Accepted Date: 27 April 2016

Please cite this article as: Methikkalam, R.R.J., Pavithraa, S., Murali Babu, S.P., Hill, H., Sekhar, R., Pradeep, T., Sivaraman, B., Thio Residue from Thermal Processing of Cometary Ices Containing Carbon disulfide and Ammonia, *Advances in Space Research* (2016), doi: <http://dx.doi.org/10.1016/j.asr.2016.04.028>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



## Thio Residue from Thermal Processing of Cometary Ices Containing Carbon disulfide and Ammonia

Rabin Rajan J Methikkalam <sup>a</sup>, S Pavithraa <sup>b</sup>, S P Murali Babu <sup>b</sup>, H Hill <sup>c</sup>, Raja Sekhar<sup>d</sup>, T Pradeep <sup>a</sup>, B Sivaraman <sup>b\*</sup>

<sup>a</sup> DST Unit on Nanoscience and Thematic Unit of Excellence (TUE), Department of Chemistry, Indian Institute of Technology Madras, Chennai, India.

<sup>b</sup> Atomic Molecular and Optical Physics Division, Physical Research Laboratory, Ahmedabad, India.

<sup>c</sup> International Space University, France.

<sup>d</sup> Atomic and Molecular Physics Division, BARC at RRCAT, India.

### Abstract

We have carried out experimental investigation on binary ice mixture containing carbon disulfide (CS<sub>2</sub>) and ammonia (NH<sub>3</sub>) ices formed at 10 K. Icy films were formed in various combinations to investigate the reactivity of CS<sub>2</sub> and NH<sub>3</sub> molecules on cometary nucleus. In the case of NH<sub>3</sub> ices, deposition carried out at 10 K was found to contain NH<sub>3</sub> homo-dimers that was found to reorient upon annealing to 40 K. Phase transition was found to take place as the 10 K ice was warmed to higher temperatures and the phase transition temperature was found to be 5 K higher for the mixed ice in comparison to the layered deposits. Thermal processing of the mixed deposition of CS<sub>2</sub>-NH<sub>3</sub> ice was found to leave thio residue, which could be ammonium dithiocarbamate that was even found to be present at 340 K.

Keywords: Astrochemistry, methods: laboratory: solid state, ISM: molecules, comets: general, infrared: general

\*Corresponding author: [bhala@prl.res.in](mailto:bhala@prl.res.in)

Download English Version:

<https://daneshyari.com/en/article/10694105>

Download Persian Version:

<https://daneshyari.com/article/10694105>

[Daneshyari.com](https://daneshyari.com)