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A variety of complex dark brown organic solids called tholins have been produced from a mixture of cosmically abundant gases upon irradiation with ultraviolet light or electrical discharges (Sagan and Khare 1979). Such tholins were probably produced in the primitive solar nebula that contributed to the present composition of carbonaceous chondrites, comets, interstellar grains and gas. Spark tholins produced from approximately equimolar mixtures of CH_4 and NH_3 , with 2.6% H_2O exhibit 50% thermal dissociation temperature of about 900°C . Sequential and non-sequential pyrolysis followed by gas chromatography/mass spectrometry are employed to study both UV (Khare et al. 1978) and spark tholins. Typical pyrolyzates of spark tholins include alkanes, alkenes, aromatic hydrocarbon, abundant nitriles, pyrroles, pyrazines and alkylbenzenes. Organic molecules uncovered by microwave line spectroscopy of the interstellar gas are plausibly derived as spallation products of interstellar tholins comparable to the origin we propose for cometary nitriles and aldehydes as the spallation products of the cometary tholins. Spark tholins are highly insulating. Their measured resistivity is 71.4×10^8 ohms-cm and does not change up to a pressure of 10^5 bars.

Another solid material considered an important candidate as a constituent of the interstellar dust is hexamethylenetetramine (HMTA) that is obtained stoichiometrically from ammonia and formaldehyde and that on heating produces largely HCN.

Some of the physical and chemical properties of both the tholins including scanning electron micrographs down to sub-micron dimensions and their visible, UV and IR spectra will be presented.

REFERENCES

- Khare, B.N., Sagan, Carl, Bandurski, E.L. and Nagy, B.: 1978, *Science* 199, p.1199.
Sagan, Carl and Khare, B.N.: 1979, *Nature* 277, pp.102-107.

DISCUSSION

Keller: How many compounds did you identify in your chemical analysis of the tholins.

Khare: Fifty compounds in the case of UV tholin (Khare et al. 1978) and about the same number of compounds in the case of spark tholin. Similar numbers of compounds in both tholins are unidentified.