Interstellar Ice Grain Chemical Composition retained in a Comet?

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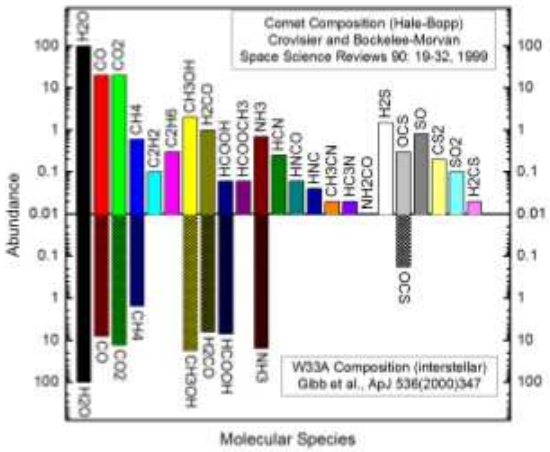
Comets, with their origin from Kuiper Belt or Oort Cloud, are supposed to be least perturbed bodies during the formation of the protostar to the evolved solar system. Rosetta discoveries, particularly the data from ROSINA mass spectrometer detecting N_2 and O_2 in the outgassing of the comet 67P/Churyumov–Gerasimenko (*1, 2*), the primordial composition of comet interior with amorphous ices from the interstellar ice grains (*3*) seems to be more realistic, but other possibilities are also suggested (*4*). Retaining their interstellar ice-grain composition is necessary if super volatiles such as CH_4, CO, N_2, and O_2, need to be retained in the cometesimals during the protoplanetary disk stage. Further, ROSINA detected several complex and prebiotic organic molecules from the comet 67P/C-G. Our laboratory studies that will be discussed and presented, have shown that many (if not all) of the complex organics detected by ROSINA can be made under interstellar ice conditions, making another compelling case for the retention of interstellar ice composition in cometary nucleus. We have recently shown that if these amorphous ices were to be exposed to higher temperatures, formation of crystalline ice expels organics (*5*). Clathrate formation is also discussed in this connection (*6*). In this talk we will focus on using complex organic molecules as tracers of cometary ice grain composition.



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References

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