Contribution ID: **285** Type: **Poster**

Radiolysis of Frozen Aqueous Solution of Methanol

Tuesday, 13 May 2014 17:15 (1h 30m)

Comets contain a silicate core, an organic refractory inner mantle and an outer mantle, predominantly of water ices in which are embedded small particles. The spectroscopic analyses suggest the presence of molecules, such as ammonia (NH3), methane (CH4), formaldehyde (H2CO), methanol (CH3OH) and hydrogen cyanide (HCN). The possibility that comets collide with planets delivering such compounds made those bodies very attractive, connecting them with chemical evolution and the origin of life on Earth.
Comets, since their formation, have been exposed, besides ultraviolet radiation, to high levels of ionizing radiation due to cosmic rays and decays of imbedded radionuclei. The bombardment by energetic particles profoundly affects the nuclei composition, and new chemical species are produced by radiolysis. Therefore, the radiation-induced reactions are very important when consider the evolution of the cometary material. The estimate of the total absorbed dose accumulated -from the internal radionuclides and external radiation- over a comet life-time is nearly 3000 MGy at the surface. For that reason, radiation chemistry can be a very precise and useful tool to simulate the evolution of organic molecules exposed to high-energy radiation during the life-time of a comet.
In this work, we analyzed the results on irradiated frozen dilute solutions of methanol, as one of the components of a nucleus comet. As a result of the radiolysis at 77 K, the active radical species form the dimeric product, glycol. The irradiation was carried out in a 60-cobalt gamma source and the irradiation doses were from 2.5 kGy to 3000 kGy.

This work was supported by PAPIIT Grant No. IN110513 and the CONACyT Grant No. 168579/11. The technical assistance from C. Camargo, B. Leal, and F. García-Flores is acknowledged.

Primary authors: Ms MELENDEZ, Adriana (Instituto de Ciencias Nucleares, Universidad Nacional Autonoma de Mexico); Prof. RAMOS-BERNAL, Sergio (Instituto de Ciencias Nucleares, Universidad Nacional Autonoma de Mexico)

Co-author: Dr COLIN-GARCIA, Maria (Instituto de Geologia, Universidad Nacional Autonoma de Mexico)

Presenter: Prof. RAMOS-BERNAL, Sergio (Instituto de Ciencias Nucleares, Universidad Nacional Autonoma de Mexico)

Session Classification: Poster Session - Radiation Chemistry

Track Classification: Radiation Chemistry