Abstract

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Isnard R., Bardyn A., Fray N., Briois C., Cottin H., Paquette J., Stenzel O., Alexander C., Baklouti D., Engrand C., Orthous-Daunay F.R., Siljeström S., Varmuza K., Hilchenbach M.:

H/C elemental ratio of the refractory organic matter in cometary particles of 67P/Churyumov-Gerasimenko.

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Context. Because comets are part of the most primitive bodies of our solar system, establishing their chemical composition and comparing them to other astrophysical bodies gives new constraints on the formation and evolution of organic matter throughout the solar system. For two years, the time-of-flight secondary ion mass spectrometer COmetary Secondary Ion Mass Analyzer (COSIMA) on board the Rosetta orbiter performed in situ analyses of the dust particles ejected from comet 67P/Churyumov-Gerasimenko (67P).

Aims. The aim is to determine the H/C elemental ratio of the refractory organic component contained in cometary particles of 67P.

Methods. We analyzed terrestrial and extraterrestrial calibration samples using the COSIMA ground-reference model. Exploiting these calibration samples, we provide calibration lines in both positive and negative ion registration modes. Thus, we are now able to measure the cometary H/C elemental ratio.

Results. The mean H/C value is 1.04 ± 0.16 based on 33 different cometary particles. Consequently, the H/C atomic ratio is on average higher in cometary particles of 67P than in even the most primitive insoluble organic matter extracted from meteorites.

Conclusions. These results imply that the refractory organic matter detected in dust particles of 67P is less unsaturated than the material in meteorites.