

Noble gases in organic and diverse bulk materials from Ryugu, Bennu and CI chondrites

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JAXA's and NASA's asteroid sample return missions revealed that C-rich asteroids Ryugu and Bennu materials are CI chondrite-like [e.g., 1,2]. Noble gas analyses contributed to the initial examination campaigns providing clues to the dynamic history and space environmental effects of their surfaces, aqueous processing and to the composition of the material in the region of the solar system in which these asteroids accreted. Here, we present first noble gas analyses of insoluble organic matter (IOM) extracted from Bennu rock treated with distinct solvents, and compare the results with Ryugu IOM and carbonaceous chondrites [3]. We compare the noble gases detected in Bennu fragments of mottled, angular and hummocky "stones of interest" with powdered aggregates, dust from Ryugu and CIs including the recently found Oued Chebeika 002 (OC2) [4]. Ryugu and Bennu are pristine and more-gas than CIs, their lithologies similar in their noble gases and OC2 lacks solar wind which effects the study of the often used CI Orgueil.

[1] Tachibana, S. et al. (2022) *Science* 375, 1011–6. [2]

Lauretta, D.S. (2024) *M&PS* 59, 2453–2486. [3]

Busemann, H. et al. (2023) 85th MetSoc #6211. [4]

Busemann, H. et al. (2025), 87th MetSoc #5257.