



## **More questions after 25 years from *Ozima-Podosek***

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In the last 25 years we have seen considerable development in noble gas geochemistry, in which especially noteworthy is the successful application of this discipline to various geological problems. Nevertheless, a few outstanding problems on fundamental issues in noble gas geochemistry still remain to be answered. These include: (1) What is the average isotopic composition of stable noble gases in the solar system? (2a) How did non-negligible amounts of noble gases (small in absolute terms but still large compared to expectations for equilibrium partitioning) get incorporated into small planetary objects such as meteorites and their parent bodies? (2b) Were noble gases in large planetary objects such as the Earth (and Mars, Venus, etc.) simply carried in by accreting small bodies or was some fundamentally different mechanism involved? (3) What processes were responsible for the major elemental/isotopic fractionation among different planetary objects?

In addition, there are also a few unsolved basic questions concerning the physical properties of noble gases, on which noble gas geochemistry is founded. These include: (4) What is the physical state of noble gases under extremely high pressure corresponding to planetary interiors? (5) What are the principal physical processes that control partition among solid-liquid-gas phases. This last issue is relevant to mantle degassing, which had motivated us to undertake the book.

We will address these issues with some retrospective remarks.