

Promethium Characterized for the First Time using Synchrotron X-rays

6-BM
BMM



Photograph of purified promethium compound. The pink-colored solid residue was obtained after several purification steps.

Driscoll DM, White FD, Pramanik S, Einkauf JD, Ravel B, Bykov D, Roy S, Mayes RT, Delmau LH, Cary SK, Dyke T, Miller A, Silveira M, VanCleve SM, Davern SM, Jansone-Popova S, Popovs I, Ivanov AS. Observation of a promethium complex in solution. *Nature* **629**, 819–823 (2024).
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Work performed in part at NSLS-II

Scientific Achievement

First synchrotron study of a promethium (Pm) coordination complex filling the final gap in understanding of the lanthanide contraction phenomenon.

Significance and Impact

A better understanding of rare earth elements in solution will lead to cleaner, more efficient separation techniques with applications in clean energy, medicine, and more.

Research Details

- Promethium is difficult to study because it has no stable isotopes and exists in a limited quantity naturally and synthetically.
- X-ray absorption spectroscopy aided in measuring the length of promethium's chemical bond with neighboring atoms in the complex for the first time.