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The Vladivostok Low Level Tritium-3He Mass Spectrometric Dating System

Anatoly Salyuk, Arkadiy Kurilenko, and Igor Semiletov

Pacific Oceanological institute Far Eastern Branch Russian Academy of Sciences, Vladivostok, Russian Federation (san@poi.dvo.ru)

Low level Tritium-3He dating system is developed at POI FEB RAS, Vladivostok, Russia, in Laboratory of Arctic Research on the basis of static vacuum Noble Gas Mass Spectrometer of the last generation Helix SFT (Thermo Scientific), which especially optimized for high precision isotopic analysis of small samples of the helium.
Our Helix SFT mass spectrometer demonstrates excellent low ion background characteristics on 3He and 4He (below 0.02 cps and 50 cps on Secondary Electron Multiplier of Low Mass Detector with resolution >700, which ensures that the 3He+ is completely separated from its 2 interferences HD+ and HHH+) and extreme low leak rate of 4He in analyzer (about 10-14 cc STP/min).
This allow us if necessary to prolong 3He measuring time several times relative common accepted values [1-3] up to 100-200 min and even more to collect required ion statistics and increase the sensitivity of the method at least several times. Product of needed sample size and time of 3He ingrowth from decay of tritium atoms in the sample for given precision will also be reduced several times.

[1] R. Bayer, P. Schlosser, G. Bönisch, H. Rupp, F. Zaucker, and G. Zimmek, Performance and Blank Components of a Mass Spectrometric System for Routine Measurement of Helium Isotopes and Tritium by the 3He Ingrowth Method, in Sitzungsberichte der Heidelberger Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Klasse (Springer Verlag, Berlin, Heidelberg, NewYork, 1989), pp. 241–279.
[2] U. Beyerle, W. Aeschbach-Hertig, D.M. Imboden, H. Baur, T. Graf, and R. Kipfer, A Mass Spectrometric System for the Analysis of Noble Gases and Tritium FromWater Samples, Environ. Sci. Tech. 34, 2042 (2000).
[3] Sültenfuß, J., Roether, W., Rhein, M., 2009. The Bremen mass spectrometric facility for the measurement of helium isotopes, neon, and tritium in water, Isotopes in Environmental and Health Studies, 45: 2, 83 – 95, http://dx.doi.org/10.1080/10256010902871929