Tritium release behavior from neutron irradiated beryllium

I.B. Kupriyanov [a*], A.V. Markin [b]

[a] *A.A. Bochvar High-Technological Research Institute of Inorganic Materials (VNIINM), Box 369, Moscow, 123060, Russia*
[b] *Institute of Physical Chemistry of Russian Academy of Science, Moscow, Russia*

The efficiency of beryllium for fusion applications will be strongly depended on its behavior under neutron irradiation. The most important consequences of neutron irradiation of beryllium are helium induced swelling and tritium retention and release.
The effect of neutron irradiation on tritium release from beryllium is described in this paper. Beryllium samples were irradiated in the SM reactor with neutron fluence (E >0.1 MeV) of 2 x 10^{22} cm^{-2} at 200^{o}C. Mass-spectrometry technique was used in out of pile monitoring of tritium and helium releases during linear temperature ramping within a temperature range from RT to 1300^{o}C.

The first signs of tritium release in the form of HT molecules were detected at temperature of 300^{o}C. Then, at temperature of 400^{o}C the release of T2 molecules also began. The maximal release rate of T2 molecules was fixed within the temperature range 900-1000^{o}C. With further increase of temperature, the release rate decreased and reduced up to a background level at temperatures still below the melting point. The total amount of tritium released as T2 molecules was 60 appm.

The helium release started in small amount at 300 ^{o}C, when first mass 4 was detected. The main part of helium was released in the temperature range from 1200 ^{o}C to melting point. The total amount of helium released from irradiated beryllium was 4300 appm.

Corresponding Author: I.B. Kupriyanov
A.A. Bochvar High-Technological Research Institute of Inorganic Materials (JSC "VNIINM")
123060, Moscow, Rogova St. 5a
Moscow, Russia
Tel.: 7-499-190 8015, Fax: 7-499-196-4168
E-mail: kupr@bochvar.ru; igorkupr@rol.ru