

INFLUENCE OF CHANGING FEED FLOW VALUE ON GERMANIUM ISOTOPE SEPARATION IN GAS CENTRIFUGE CASCADE

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During the operation of gas centrifuge (GC) cascade for the multicomponent isotope mixture (MIM) separation there are nonstationary hydraulic processes when the values of pressures and process gas flows change in the cascade stages and in outgoing flows. One of the most frequent origins of nonstationary processes is change of cascade flow rate (feed, light or heavy fraction). Research of these processes is of interest for determination laws of isotope concentration change.

This article contains the research results for nonstationary transfer of isotopic mixture in GC cascade caused by the change in values of cascade feed flow. The research considers the case of germanium isotopes that are applied in production of semi-conducting materials and research of neutrinoless double β -decay. Germanium isotopes are also used as a starting material for arsenic radioactive isotopes (e. g. ^{70}Ge is used to obtain radioactive ^{72}As that finds application in medical diagnostics).

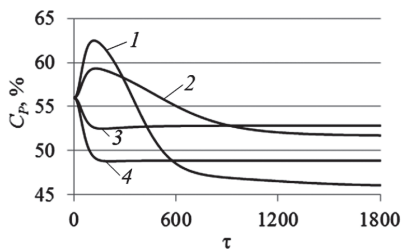


Fig. 1. Concentration of ^{72}Ge in the light fraction flow during a nonstationary process:

1 — $F_{\text{end}}/F = 0,8$; 2 — $F_{\text{end}}/F = 0,9$; 3 —
 $F_{\text{end}}/F = 1,1$; 4 — $F_{\text{end}}/F = 1,2$

It was determined that during a nonstationary process, the concentrations of isotopes with intermediary mass number in light and heavy fraction flows may cross the range limits restricted by the initial and final stationary values and exceed the maximum reachable values for a three-flow cascade. Time for stationary isotope concentrations to settle is different for isotopes and depends on the final values of cascade flow.