HYDROGEN ISOTOPE SEPARATION BY THE METHOD OF CHEMICAL ISOTOPE EXCHANGE BETWEEN HYDROGEN AND WATER IN THE DIFFERENT TYPE OF MEMBRANE CONTACT DEVICES

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For hydrogen isotope separation by the method of isotope exchange between water and hydrogen the membrane contact devices was developed in the D. Mendeleev University of Chemical Technology of Russia. A distinctive feature of these contact devices is the spatial separation of the liquid water flow from the catalyst by means of a membrane having a low gas permeability and high permeability for water molecules. The results of the study of mass exchange characteristics of the process in contact devices with flat and tubular Nafion-type membranes and hydrophobic (RCTU-3SM) or hydrophilic (Pt/Al₂O₃) catalysts are present. The adequacy of the algorithm for calculating the mass exchange characteristics of the process based on the equations of the additivity of resistances to mass transfer is shown for all the contact devices with different contact surfaces, different amounts and types of catalysts. It is shown that the greatest resistance to mass transfer is due to longitudinal mixing or mass transfer on the surface of the membrane, depending on the conditions of the process. Under comparable conditions the volume of the theoretical separation stage for membrane contact devices is more than 2 times lower than for devices with traditional packing.

Keywords: membrane contact device, hydrogen isotopes, chemical isotope exchange.

NATIONAL RESEARCH NUCLEAR UNIVERSITY MEPHI



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Main Building of MEPhI and Hotel Intourist Kolomenskoe November 20-22, 2017, Moscow, Russia