PRODUCTION OF MOLECULAR HYDROGEN (AN ENVIRONMENTALLY FRIENDLY FUEL) BY THE INTERACTION OF γ-RAYS WITH THE BeO/H_2O SYSTEM

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Conducted studies showed that radiation-chemical yield of molecular hydrogen, under radiation-catalytic influence by γ-quanta on some metals or metal oxides, especially beryllium and beryllium oxide, in contact with water, is much higher. We investigated the radiation-chemical yield of molecular hydrogen obtained by the radiation-heterogeneous transformation of water under the influence of gamma rays (^{60}Co, P=18.17 rad/sec, T=300K) on beryllium oxide system with particle sizes d< 4 μm, 32–53 μm and 75–106 μm + adsorbed water and by suspending particles in water. Table compares experimental and model values of the energy yield of molecular hydrogen obtained during the radiolysis of water adsorbed (θ=4) on BeO surface with particle size of d< 4 μm, d=32–53, 75–106 μm.

Table

Comparison of values obtained from experimental and model-based calculations of molecular hydrogen energy yields in the BeO+H_2O system

d < 4 μm	32–53μm	75–106 μm	$G_n(h^+\text{-}e^-)$	$G_n(L_{1v})$	$G_n(H_2)$
Energy yield of H_2, $G_t(H_2)$ molecule/(100 eV)			Values based on the model		
6.4	3.81	2.8	9.1–4.23	3.89–0.9	6.5–2.57

The maximum radiation-chemical yield of molecular hydrogen obtained from the radiation-catalytic decomposition of water in systems BeO/H_2O with particle sizes d< 4 μm, d=32–53 and 75–106 μm (θ=4) under the γ-quanta influence are $G(H_2)$=6.4; 3.81 and 1.83 molecule/100 eV accordingly. The acquisition of molecular hydrogen is explained according to the recombination and exciton mechanism, which corresponds to the theoretical values ($G_n(H_2)$=6.5–2.57).