In this work we generalize existing theory of low-energy collisions of atomic hydrogen with its anion. We extend the non-local resonance model for this system by adding new discrete state and two continua that are coupled with it. We calculate numerically cross sections for associative electron detachment process that is important for models of early universe. We add cross section for collision detachment and show spectra of outgoing electrons. We show how the isotopic effect is involved in studied collision. We also calculate charge transfer, elastic scattering cross sections, and reaction rates for hydrogen collisions with deuterium anion. We compare our results with recent experiments and we discuss their reliability.