

In the presented thesis we study quantum reaction dynamics of H_2O^+ using semiclassical method. Using *ab initio* quantum potential evaluated on a fine grid we derive analytical formula for potential energy surface, which is used for solving classical equations of motion. A reaction path is analyzed using contour plots with a focus on a saddle point area. Reaction dynamics analysis is focused on properties of interaction probability and cross section depending on impact parameter, collision energy and initial vibrational state of interacting molecule. Final results are compared with experimental data.