In this research we derive a residual based a posteriori error estimation for the hp- Adaptive Finite Element Method (hp-AFEM) for the steady state Stokes problem which describe slow motion of an incompressible fluid. The error estimator is obtained by extending the idea of a posteriori error estimator for the classical h-version of AFEM. The reliability and also the efficiency of the introduced error estimator are established. Moreover, we have proved that our hp-adaptive FEM method is a contraction both in energy error and also in quasi-error. The numerical experiments show the performance of the introduced adaptive hp-FEM algorithm using the proposed a posteriori error estimator. (Received August 11, 2015)