Torus reactors are characterized by a homogeneous fluid circulation without dead zones. Torus reactors were used for applications in biotechnology, food processing, polymerization and liquid waste treatments. The relatively simple extrapolation of performances, due to the absence of dead volume, is one of the main advantages of this reactor, with low shear stresses and an effective radial mixing allowing efficient heat dissipation. This study is based on the mixing in order to analyse the fluid circulation, mainly in turbulent flow regime, and to characterize the torus reactor with the axial dispersion plug flow model. The objective of this study is to characterize the flow and the mixing in the torus reactors in batch and continuous modes. The mixing analysis was made according to the flow parameters and to the geometrical characteristics of the reactor and impeller. The mixing in the torus reactor can be characterized by the Péclet number, Pe_D, defined with torus diameter. A representative model based on plug flow with axial dispersion and partial recirculation was proposed