Deodorization – the removal of foul-smelling compounds – gains of increasing importance. The theoretical description of processes by mathematical models makes planning and design of process equipment easier. According to this *Computational Fluid Dynamics* gets more in the focus of interest. This thesis deals with the experimental characterization and mathematical modeling of two reactors for deodorization of aqueous systems.

The spray reactor represents a continuous counter-current process of deodorization. The characterization is based on both experiments and a developed mathematical model. The non-availability of life time of the generated droplets makes an adaptation within the model necessary. The adapted values are supported by the theoretical results using *CFD*.

The stirred semi-batch reactor is a semi-continuous method of deodorization. This type is used for removing ammonia out of aqueous systems, e.g. waste waters of dumps, industry and animal farms. Because of its batch operation the stirred semi-batch reactor is interesting especially for small and middle sized companies. It is important to consider the *pH*-depending equilibrium between ammonia and ammonium which has a big influence on the deodorization performance. These effects are also taken into account of the developed mathematical model.