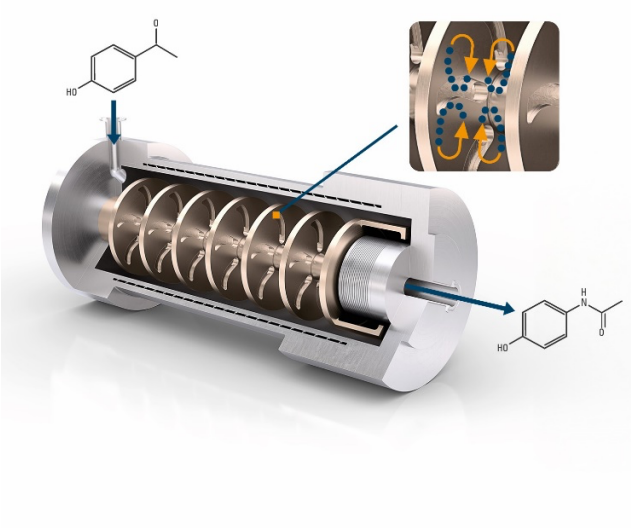
Evaluation of scalability parameters in synthesis using agitator bead mills for mechano-chemistry

Philippe Roth, Kenneth Banderob

WAB-GROUP®, Junkermattstrasse 11, 4132 Muttenz, Switzerland,
p.roth@wab-group.com

Mechanochemistry, the study of chemical reactions driven by mechanical force, has emerged as a promising approach for more sustainable chemical processes. Unlike conventional methods that rely on heat, solvents, or other energy-intensive techniques, mechanochemistry utilizes mechanical energy to initiate or accelerate reactions, often under milder conditions. This offers significant advantages, including reduced energy consumption, minimized waste, and the re-placement of hazardous solvents with greener alternatives.



The goal of WAB-GROUP® is to develop cutting-edge technologies to provide customers with state-of-the-art solutions (the picture shows the principles of a continuous flow reactor). To as-sess the potential of the existing equipment for mechanochemical processes, a thorough evaluation of key process parameters was conducted, including heat transfer coefficients for various product flows, cooling media, and process settings, as well as residence time distributions under multiple operating conditions, and micro mixing efficiency. These studies aimed to fully characterize WAB mills and identify their properties towards mechanochemical applications.
A particular focus was placed on the WAB IMPA°CT REACTOR®, which integrates both conventional flow chemistry and bead milling technology. Applications on the paracetamol synthesis [1] and the overall benefits of the technology for chemistry and the environment will also be displayed

[1] R. Geib, E. Colacino, L. Gremaud, *ChemSuSChem*, **2024**, *12*, e202301921 .