

SIMPLIFIED EXTRACTABLES AND LEACHABLES ASSESSEMENT USING PRIOR KNOWLEDGE AND IT SOLUTIONS

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The COVID-19 pandemic crisis revealed that a fast development of life-saving vaccines is of high importance, **and** it is possible. For future pandemic crisis, initiatives worldwide, claim a vaccine development in less than 100 days.¹ This is possible when using prior-knowledge e.g., from existing processes qualifications.

The E&L assessment of SUS is an example that can be simplified and improved based on existing data pools by rigorously using modelling algorithms, statistical data evaluations, digital twins, and artificial intelligence (AI). For this purpose, Sartorius developed an IT platform capable of creating extractables assessments almost automatically after adding relevant input parameters including process parameters.

The IT platform - "ExSim" - relies on an extensive database containing a full inventory of results from harmonized extractables studies, including physicochemical and toxicological information of the extractables. It uses deterministic retrieval algorithm to enable exposure calculations for SU devices and assemblies for subsequent comparison with thresholds and limits (PDE or TTC). Statistical tools allow error estimations, and vector and cluster analysis of extractables and exposure data, as required in equivalency investigations.

Four use cases demonstrate the capability for a fast, reproducible, and sustainable assessment of Extractables with ExSim reducing the need of time consuming and expensive laboratory testing.

1. Prediction of extractables profiles for SU devices of different sizes and complex assemblies.
2. Calculation of exposure data, with a subsequent automated safety-assessment; including a discussion of deviations and propagation of deviations.
3. Equivalency study of extractables profiles of a SU assembly before and after a component change, including the evaluation of the impact on the safety assessment.
4. Using the system to extrapolate extractables data to USP <665> conditions for a safety assessment of a large volume injectable drug product.

With ExSim a "warp-speed" E&L assessment even for complex SU systems is feasible. The workload of data harvesting and assessment commonly associated with E&L qualification is reduced to a minimum. The results obtained are reproducible and reliable and with that ExSim is the preferred tool for future E&L process qualification exercises.

¹ <https://www.nejm.org/doi/full/10.1056/NEJMp2202669>].