A method for the selection of appropriate solvents for the solvent swap task in pharmaceutical processes has been developed. This solvent swap method is based on the solvent selection method of Gani et al. (2006) and considers additional selection criteria such as boiling point difference, volatility difference, VLE phase diagram analysis, and azeotropic information that are particularly important for the solvent swap task. The method employs a solvent-swap database together with calculation tools for properties–functions of solvents. The database contains solvents that are commonly used in pharmaceutical processes as well as new solvent swap alternatives. The method takes into account process considerations such as batch distillation and crystallization to achieve the swap task. Rigorous model based simulations of the swap operation are performed to evaluate and compare the performance of the selected solvents. A guide and a software tool that allow the fast and reliable identification of the swap solvent have been developed. The main features and the applicability of the method are highlighted through several practical examples.