A simple and sustainable membrane assisted process for the preparation of macrocyclic musks by ring closing metathesis

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Macrocyclic musks are important molecules produced industrially by the fine chemical industry on large scale. Their synthesis is complicated, however, by the fact that the cyclisation reaction must be carried out at high dilution to ensure cyclisation rather than unwanted secondary reactions. Ring-closing metathesis has been used on numerous occasions to prepare these molecules, but very few studies address the quantity of solvent required. The aim of this work is to develop a simple, easily implemented methodology to prepare these macrocyclic musks in a sustainable manner. Coupling of a continuous stirred tank reactor to a membrane designed to recycle solvent will provide a practical solution to the issue of solvent use. For this to be achieved the correct membrane, catalyst and process must be identified. With the appropriate combination of catalyst, membrane and process, solvent volumes for the cyclisation reaction have been reduced by up to 85% whilst still maintaining good conversion and yield. The reaction product can be easily isolated from reaction mixture in high purity, and and the process still requires less solvent than a comparable batch reaction, even after the isolation step.