

Use of CFD for mechanical design improvements

HPC-Competence Center

High Performance Computing (HPC) Wales is Wales' national super-computing service provider. Host to the UK's largest national distributed supercomputing network, HPCWales provides businesses and researchers with local access to world-class technology and the support to fully exploit it.



Enterprise

Established in 2011, Farmaceutical Innovations was founded by Dr Kevin Wall, a Fellow of the Institution of Chemical Engineers. Farmaceutical Innovations target three different business areas: chemical/phytochemical process development, supply of phytochemicals and toll extraction of phytochemicals.

How HPC makes the difference

Farmaceutical Innovations have extensive experience in developing their own processes to extract high quality products from plants that will find application as ingredients for pharmaceuticals, nutraceuticals, flavours, fragrances cosmetics and biopesticides. Since 2007, Managing Director Dr Kevin Wall has been working to develop an efficient and effective process for extracting the pharmaceutical, galanthamine, from daffodils. The process uses a series of rotating disc contactors that purify the plant extracts using immiscible solvents to obtain the galanthamine (see Figure 1). The problem was that there are a large number of design parameters for the rotating disc contactors and there is little in the way of published design correlations that could be used to optimise the mechanical design. It would be a major exercise to determine the impact of the various design parameters experimentally and so the use of computational fluid dynamics (CFD) was deemed an appropriate approach. However, CFD is normally only available to large corporations and universities.

Farmaceutical Innovations attended a course in OpenFOAM CFD delivered by the HPC Wales Skills

Academy in order to learn to use open-source computational fluid dynamics software. This required a significant time investment by Farmaceutical Innovations and constituted another barrier to immediate use of HPC. Unfortunately, progress to date on the project has been limited because the customer for the technology ran into financial problems and the development work was placed on hold. However, the customer is now functioning properly again and the expectation is that the development work will restart early in 2016.



Fig: Dispersion of solvent drops by a rotating disc stack

