

TFM 3: Study and optimization of Cu-catalysed flow chemistry reactions

Flow chemistry, compared to batch processing, generally provides increased safety, enhanced control over reaction conditions, and improved scalability and efficiency. This approach often leads to more consistent product quality, reduces waste, and can be more energy-efficient, making it a more sustainable choice in chemical processes. This Research Project will be experimental. A copper-tubing reactor will be constructed within a standard flow-chemistry laboratory set-up.

The exact reaction specification is unknown as of the start of the Project. Therefore, firstly a reaction that provides a yield must be found through experimenting with a variety of different solvent-base pairs. I will find the corresponding yield through NMR Spectroscopy, training of which will be completed within Week 2. Following this, the solvent, base, reagent, catalyst etc., will be fixed, and the operating parameters (temperature, residence time, etc.) will be varied to find the optimal process conditions. Within this optimisation, a 'Design of Experiment' framework will be utilised, to increase the efficiency of my lab work. Several flow chemistry related parameters will be looked at, including how much of the catalyst is used up, as well as monitoring the consistency of the reaction.

Supervisor: Dr Javier Fernández García & Dr Xavier Berzosa.

Main contact: Dr Javier Fernández García

Position for one student.