Development of coupling reactions catalyzed by ultra-low concentrations of metal catalysts using microwave heating

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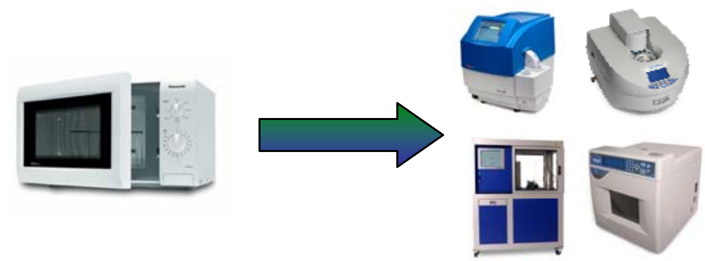
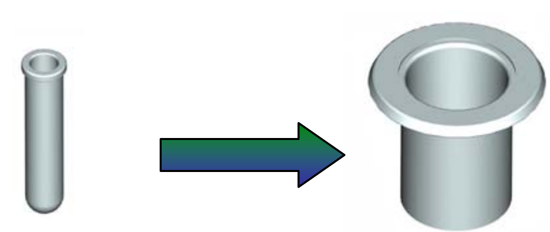
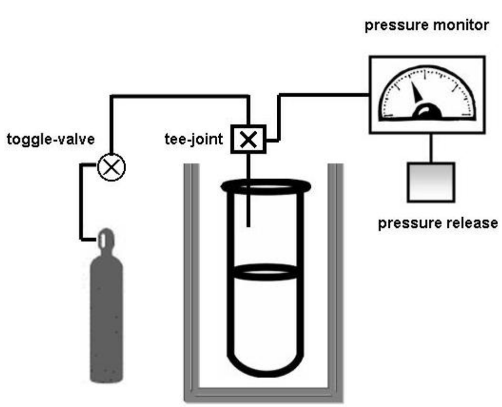


food *chemistry*

We all know that the fastest way to heat something at home is in the microwave. The same is true for chemists, microwave heating offers a fast way to make reactions go. Work in our laboratory is focused around using microwave heating to facilitate a wide range of reactions of interest to academic and industrial chemists. We use scientific microwave systems because they are safer and more reliable than domestic (household) microwaves.

The first area we have been working on with the PRF funds is addressing the need for scale-up of microwave promoted reactions. It is all well and good being able to make a few milligrams of a compound but, if the technology is going to be industrially viable, larger scales are going to be required. This year we have developed methods for performing reactions on the hundreds of grams scale using water as a clean solvent and very low levels of metal catalysts. We also have probed the energy efficiency of the process.





The second area of study has been the use of gases as reagents for reactions using microwave heating. This has involved building apparatus and then using it. We have focused on two important reactions to industrial chemists, one using carbon monoxide as the gaseous reagent and one using ethene. We have developed clean, fast, easy methodologies in both cases.