

Sustainability and systems thinking: Greening the lab class practical by practical

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At the University of Southampton, we have always sought to include sustainability aspects from chemistry and chemical engineering in our teaching laboratories and to inform our undergraduate practicals by recent research. In the context of systems thinking and sustainable development goals, this is easier in a cohesive lecture course, but it can also be implemented stepwise in a laboratory module.

Sustainability in undergraduate practical classes and how it can be strengthened with systems thinking in a time-limited setting was the development challenge. Here we portray the outcomes with several practicals, featuring process design, sonochemistry, mechanochemistry, flow and microwave chemistry in carbon-carbon bond formation reactions, extractions, and syntheses under inert conditions. To advance consciousness about environmentally friendly solutions we highlight an undergraduate project about improving an industrial process through a novel heterogenous catalyst.

Recently we also widened the delivery and assessment of the laboratory modules to include transferable skills and practical competencies and underpinned these with support from various internal and external partners.

In this presentation we will discuss examples for these on a practical-by-practical basis and contrasted with the latest ideas how to raise awareness of green chemistry in chemistry education through engaging chemistry laboratory classes.

Keywords: Green chemistry; laboratory classes; systems thinking; sustainability