

Smart Notes

QA

Why use a twin screw extruder for reactive organic reactions?

Many organic reactions such as reductions or addition reactions take place in solvents. The chemicals are diluted into solutions and react there, sometimes over a long period of time, to form the desired product. Subsequently, the product must then be separated from the solvent, any by-products, and any remaining unreacted starting materials. This process has many obvious points for possible improvement. The use of a twin-screw extruder is one way to tackle several of these issues at once.

Twin screw extruders are already used for manufacture of thermoplastic polyurethane elastomers (TPU) in commercial scale. The polymerization and further processing happens in the same instrument. The same principle can work also for other organic reactions.

Mechanochemistry offers a way of allowing reactants in solid form to react with one another quickly and with high yields, without the need for solvents. The use of ball mills to grind reactants into fine particles has already shown the viability of this approach on a small scale; transferring this methodology to a twin-screw extruder allows for larger-scale, continuous processing (Figure 1). Many different types of organic reactions can be carried out on an extruder: production of co-crystals for pharmaceutical applications; usage of metal organic frameworks (MOFs) as catalysts; synthesis of organic molecules in addition reactions; condensation reactions; production of dyes; and more.

The Thermo Scientific™ Process™ 11 Twin-screw Extruder is an ideal introduction to this technology. The Process 11 extruder can work with even the smallest quantities, completely solvent free, at low temperatures and with high yield. Its compact size also permits work in a chemical fume hood, and the entire instrument can even be placed into a glove box if the raw materials being used make it necessary (Figure 2).

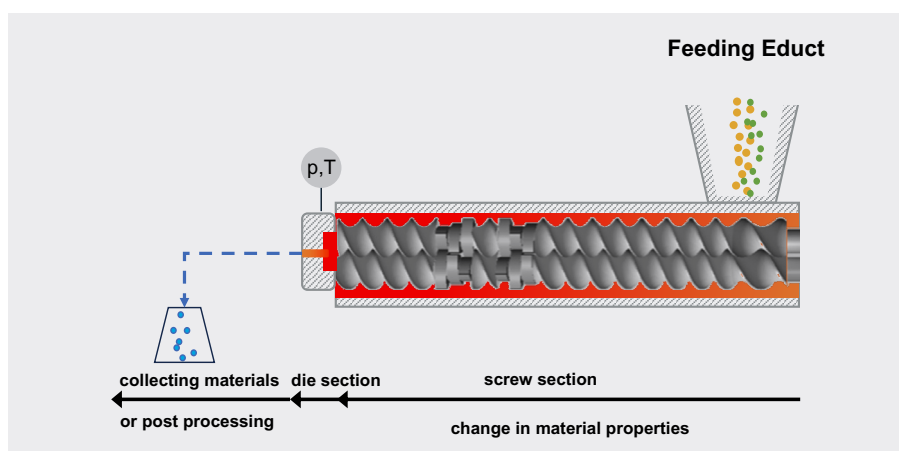


Figure 1: Schematic reactive extrusion process.

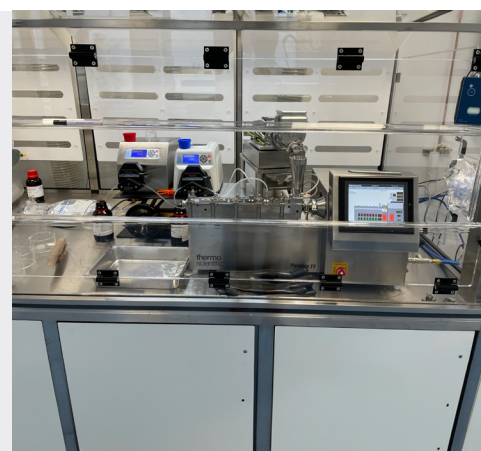


Figure 2: Reactive Extrusion with a Process 11 Extruder in a safety cabinet.

Learn more about Thermo Scientific Extruders at thermofisher.com/extruders

thermo scientific

For research use only. Not for use in diagnostic procedures. For current certifications, visit thermofisher.com/certifications.

© 2024 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific and its subsidiaries unless otherwise specified. SN64714 02/24