Application of Flow Chemistry in the Synthesis of Iminosugars

Jack BENNETT [1], Paul MURPHY [1]

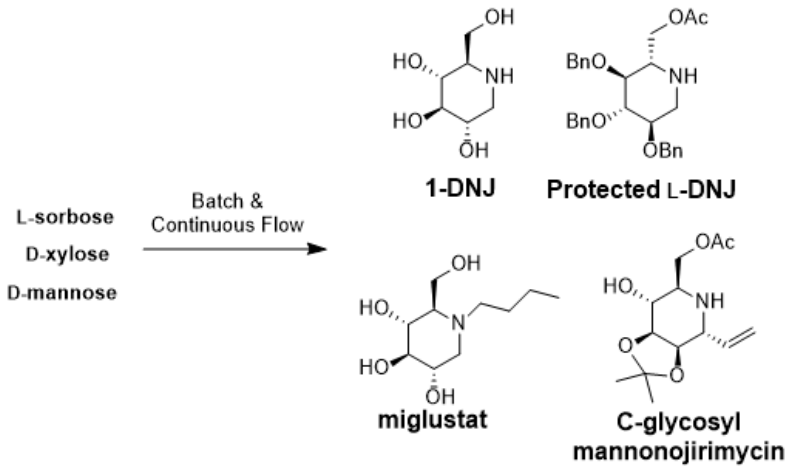
[1] University of Galway, Ireland

j.bennett5@nuigalway.ie

Iminosugars are a subset of glycomimetics in which the ring oxygen of a sugar is replaced with nitrogen. These mono-/bicyclic structures are potent inhibitors of many glycoprocessing enzymes, particularly glycosidases, and they are currently marketed for treatment of Type 2 diabetes, Gaucher disease and Fabry disease.[1] In addition to their current therapeutic uses, they have demonstrated potential as antivirals.[2]

Continuous flow chemistry involves the mixing of reagents in continuous streams through defined reactor zones (e.g., coiled tube reactors), as opposed to the traditional batch methods of carrying out reactions in flasks/vessels.[3] Flow chemistry has received much attention in recent years in both research and industrial laboratories for its potential advantages over batch processes, such as improved mixing, greater heat transfer, potential for automation, ease of scale-up and improved safety.[4]

My research is focused on improving the synthesis of valuable iminosugars (such as 1-DNJ) from renewable sugars through batch and flow techniques. The primary aim is to investigate the potential for flow chemistry in key steps to produce improvements in yield, reaction time and safety, along with creating greener processes.



Overview of Iminosugars Synthesised Using Batch & Continuous Flow Techniques

Bibliographic references:

1. R.J. Nash, A. Kato, C.Y. Yu, G.W. Fleet (2011), Future Med. Chem. (3), 1513-1521.
2. D.S. Alonzi, K.A. Scott, R.A. Dwek, N. Zitzmann (2017), Biochem. Soc. Trans. (45) 571-582.
3. M.B. Plutshack, B. Pieber, K. Gilmore, P.H. Seeberger (2017), Chem. Rev. (117) 11796-11893
4. D.T. McQuade, P.H. Seeberger (2013), J. Org. Chem. (78) 6384-6389.