Chemical Process R&D for Drug Substance Production

Dr. Murat Acemoglu

Novartis Pharma AG, Novartis Campus, CH-4052 Basel, Switzerland
murat.acemoglu@novartis.com

Chemical Process R&D in the Pharmaceutical Industry is primarily directed towards (i) quality, (ii) quantity, and (iii) cost/efficiency of drug substance syntheses. The achievement of adequate quality for drug substances is a must and has the highest priority. This includes the purity and also the stability of drug substances. General rules for the quality of drug substances are defined in ICH guidelines\(^1\). Additional guidelines can be obtained from EMA\(^2\) and FDA\(^3\) as well as from local Health Authorities.

Meeting the market needs for drug substances in a safe, efficient and environmentally acceptable way is also very important and one of the major goals of chemical process R&D. The selected synthesis route plays a key role on the way to achieve this goal. Process safety\(^4\) and environmental impact\(^5\) of the synthesis route are among the most important factors influencing the production efficiency and the cost of a drug substance.

Finally, understanding the mechanism of each single reaction of the synthesis is key to achieve an optimal process for the production of a drug substance. This will be exemplified using different reactions selected from different drug substance syntheses.

References:

1) International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (see www.ich.org)
2) European Medicines Agency (see www.ema.europa.eu)
3) U.S. Food and Drug Administration (see www.fda.gov)