



Introduction to the pharmaceutical industry

The pharmaceutical industry is arguably one of the leading sectors in the application of green chemistry to business. Many companies now have in-house green chemistry teams and initiatives to drive up-take of green chemistry practices within the business. This module provides an overview of the pharmaceutical industry in terms of the development of a pharmaceutical product, timescales, barriers and restrictions as well as an introduction to key reaction types of interest.

Learning Objectives

By the end of this module you should:

- Be aware of the timescales for a pharmaceutical company to bring a new drug to the market;
- Be able to identify key transformations for the pharmaceutical industry and explain some of the current problems surrounding them.

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Timeline of a pharmaceutical compound

In this video Wim Aelterman describes a typical pharmaceutical pipeline, whereby the initial stages of pharmaceutical development move on from medicinal chemistry through patenting and Phase I, II and III testing before launch. The preparation for launch of a pharmaceutical has to include the development of a commercial process, as amounts of active ingredient required for testing rise, and setting of price relative to investment in testing and the patent lifetime.



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Key transformations

Reviews of current and pipeline pharmaceutical industry processes and of recent publication relating to pharmaceuticals have been conducted. This has allowed analysis of the most prominent types of transformation within the pharmaceutical industry, which has subsequently been used to focus research and development effort towards the most commonly used transformations, as well as the least sustainable processes.

This material will appear soon!

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Summary and further reading

The development of a pharmaceutical is a complex and lengthy process, requiring large teams of people from different scientific backgrounds to work together in a time-pressured environment. Time to market and costs are significant areas of focus: the high attrition rate is a problematic but unavoidable aspect of this industry. There is still unmet medical need in certain areas and therefore good medicines will still make money. Sustainable manufacturing is not easy to achieve but it is necessary to ensure the continuation of this vital industry.

Recommended reading:

D. Taylor, in *Pharmaceuticals in the Environment*, eds. R. E. Hester and R. M. Harrison, Royal Society of Chemistry, Cambridge, UK, 2015, ch. 1, pp. 1-33.

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