

Foreword

Process engineering, the science and art of effectively transforming feedstock materials into commercial products, was born in the 19th Century. Its origins can be found further back in the course of history: fermentations, distillations, macerations, and extractions enabled our remote ancestors to enjoy edible, potable, and pharmaceutically active substances, as mining, grinding, mixing, and smelting produced metals to be worked up into useful products – swords as well as ploughs. But it was only with the quantitative description of chemical science in the 19th Century that the engineering of processes could be put on a rigorous basis. The great chemist, Antoine Lavoisier had shown the way when he formulated the law of conservation of mass in 1789. The subsequent development of thermodynamics initiated by Lazare Carnot and continued by Clausius, Kelvin, Gibbs, and others, gave us the framework for designing efficient processes. As a result, by 1900 the world's production of basic chemicals like sulphuric acid was measured in millions of tonnes, and a vast range of new products, from dyestuffs to aspirin became available to the general public.

And so our profession has continued to develop, with the new science and technology enabling new processes to make new products, and new requirements stimulating new discoveries and more innovation. In parallel, *process engineering* itself has developed its own methods, theorems, terminology, and literature, organising and recording the advances made and applied.

The role of the industrial company in the history of process engineering is an honourable one, and we can be proud of the way in which the products we make have contributed to the health, welfare, and quality of life of the world's population. We have, it is true, suffered some terrible accidents, and we have been slow, in some cases very slow, to recognise the effects of our activities on the environment. But we can also be proud of the contribution of process engineers in introducing better approaches to industrial safety and environmental protection. "Systems thinking" with its imperative to look at the whole problem – the complete lifecycle, the entire

supply chain, the integrated plant – is a grand discipline for dealing with complex issues far beyond the limits of the chemical and process industries.

There are many texts dealing with the technologies of our profession, from reactor engineering to process control, but there are surprisingly few which deal with process engineering in the context of an industrial company, as this book does. That context is really important, as Industry has a vital role in solving the problems of excessive reliance on fossil fuels, meeting the challenge of sustainable development, exploiting the opportunities provided by the revolutions in biotechnology and information technology, and harnessing the power of change and innovation – the big issues of our time.

The authors have combined to write an authoritative account of process engineering and the business company, based on their extensive practical experience. It is a *tour de force*. I commend it to students, teachers, and practitioners alike. Read on!

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