

This Week's Citation Classic

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Levenspiel O. *Chemical reaction engineering*. New York: John Wiley and Sons, 1962. 578 p.

A few principles govern the design of all chemical reactors whether they be sludge ponds, fermentation vats, catalytic crackers, ore roasters, or that beastly cigarette. CRE is an introductory textbook which presents these principles from a general point of view. An extension of this approach is presented in *Chemical Reactor Omnibook*.¹ [The SCI[®] indicates that this book has been cited over 795 times since 1962.]

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'You've never had a course in chemical reactors? Well then, how about teaching it this fall?' That was my first teaching assignment after graduate school, and it was a nightmare. A contributing factor is that the only textbook available at that time was complex, focused on petrochemical applications, and used its own particular jargon. Year after year, at all the schools I was associated with, I got stuck with this course, and never was satisfied with it. To me it was nearly as ugly as thermodynamics.

"But in the middle 50s revolutionary ideas were being developed in European circles to the effect that a small cluster of principles govern the design of all types of reactors. These ideas were all brought together in the First European Symposium on Chemical Reaction Engineering in 1957, and how simple and beautiful it was. I read the proceedings, it made sense to me and it was just what I was looking for. My course on reactors changed radically,

and my notes evolved into the book which I naturally called *Chemical Reaction Engineering*, or CRE for short, a term coined by this European group.

"One characteristic of US education is its flexibility and adaptability. Thus, when a conceptual breakthrough such as the idea of chemical reaction engineering becomes available teachers are not afraid to experiment and try teaching the subject, and so new courses are introduced into the curriculum. That's what happened here. Just before the 1957 symposium only 18% of all chemical engineering departments in the US offered an undergraduate course in the subject; a few years later the number rose to 58%. *Au contraire*, European education evolves more slowly, and only after the subject was firmly established in the US did Europeans consider introducing it into their curricula. And it was their idea in the first place!

"Why so many references to my elementary book? First of all, it has some original material. Also, it presents design procedures for many reactor types, so those writing papers often start by saying, 'The basic equations come from CRE. Let us continue from there....' I should warn that being the lead reference in a paper has distinct drawbacks because journal editors seem irresistibly attracted to that spot. Thus through the years I have been swamped with articles to review from many, many journals and grant givers.

"Today CRE is a mature discipline and a core subject in chemical engineering education worldwide. It has over 20 English language texts at various levels, and its methods are accepted and widely and successfully used by industry. It is hard for us to realize that barely 20 years ago it was unknown. But what really amazes me is that the whole subject of chemical reactors and their design is of no interest at all to chemistry professors. I wonder why?"

1. Levenspiel O. *Chemical reactor omnibook*. Corvallis, OR: OSU Bookstores. 1979. 672 p.