

Controversies and Contradiction in (IR) Reversibility and the Equilibrium of Reactive Systems

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Abstract : Reversibility, irreversibility, equilibrium and steady-state that play a central role in the thermodynamic analysis of processes arising in the context of reactive systems are discussed in this article. Such concepts have generated substantial doubts, even among the most experienced researchers, and engineers, because from the literature, conclusive or definitive statements cannot be extracted. Concepts such as the time-reversibility of irreversible processes seem paradoxical, requiring further analysis. Equilibrium and reversibility, which appear to be of the same nature, have also been re-examined in the light of maximum entropy. The goal of this paper is to revisit and explore these concepts based on classical thermodynamics in order to have a better understanding them due to their impacts on technological advances, as a result, to generate an optimal procedure for designing, monitoring, and engineering optimization. Furthermore, an effective graphic procedure for dimensioning a Plug Flow Reactor has been provided. Thus, to meet the needs of chemical engineering from a simple conceptual analysis but with significant practical effects, a macroscopic approach is taken so as to integrate the different parts of this paper.

Keywords : reversibility, equilibrium, steady-state, thermodynamics, reactive system

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