



# Nonequilibrium Thermodynamics: Transport and Rate Processes in Physical, Chemical and Biological Systems

*Yasar Demirel*

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Natural phenomena consist of simultaneously occurring transport processes and chemical reactions. These processes may interact with each other and may lead to self-organized structures, fluctuations, instabilities, and evolutionary systems. *Nonequilibrium Thermodynamics, 3rd edition* emphasizes the unifying role of thermodynamics in analyzing the natural phenomena.

This third edition updates and expands on the first and second editions by focusing on the general balance equations for coupled processes of physical, chemical, and biological systems. The new edition contains a new chapter on stochastic approaches to include the statistical thermodynamics, mesoscopic nonequilibrium thermodynamics, fluctuation theory, information theory, and modeling the coupled biochemical systems in thermodynamic analysis. This new addition also comes with more examples and practice problems.

- A useful text for seniors and graduate students from diverse engineering and science programs to analyze some nonequilibrium, coupled, evolutionary, stochastic, and dissipative processes
- Highlights fundamentals of equilibrium thermodynamics, transport processes and chemical reactions
- Expands the theory of nonequilibrium thermodynamics and its use in coupled transport processes and chemical reactions in physical, chemical, and biological systems
- Presents a unified analysis for transport and rate processes in various time and space scales
- Discusses stochastic approaches in thermodynamic analysis including fluctuation and information theories
- Has 198 fully solved examples and 287 practice problems
- An **Instructor Resource** containing the **Solution Manual** can be obtained from the author:  
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