Thermodynamics Books

📘 1. Classic, foundational texts

These are the works that *created* the thermodynamic formalism for dynamical systems.
They're rigorous but beautifully conceptual — ideal if you want the mathematical foundations.

Reference	Notes
David Ruelle — *Thermodynamic Formalism: The Mathematical Structure of Equilibrium Statistical Mechanics* (Addison-Wesley, 1978; reprinted by Cambridge, 2004)	The foundational monograph. Introduces pressure, Gibbs measures, variational principles, and symbolic dynamics. Still the reference point.
Ya. G. Sinai — *Topics in Ergodic Theory* (Princeton Univ. Press, 1994)	Originator of Sinai–Ruelle–Bowen (SRB) measures. More concise and ergodic-theory–oriented.
Rufus Bowen — *Equilibrium States and the Ergodic Theory of Anosov Diffeomorphisms* (Lecture Notes in Mathematics, 470, Springer, 1975)	A companion to Ruelle — focuses on uniformly hyperbolic systems. Defines equilibrium states via pressure and establishes uniqueness results.

If you read **Ruelle (1978)** and **Bowen (1975)** together, you essentially see the entire architecture of the formalism.

📗 2. Modern, readable introductions (for physicists and applied scientists)

If you want intuition and examples (like the logistic map, symbolic dynamics, Lyapunov spectra, etc.), these are more approachable:

Reference	Description
Pierre Gaspard — *Chaos, Scattering and Statistical Mechanics* (Cambridge University Press, 1998)	Excellent bridge between physics and rigorous dynamical systems. Chapter 9 ("Thermodynamic Formalism") gives a physicist-friendly derivation of topological pressure, entropy, and escape rate.
R. Klages — *Microscopic Chaos, Fractals and Transport in Nonequilibrium Statistical Mechanics* (World Scientific, 2007)	Uses thermodynamic formalism to connect chaos to transport coefficients and multifractal spectra.
Tél & Gruiz — *Chaotic Dynamics: An Introduction Based on Classical Mechanics* (Cambridge, 2006)	Gentle and physical — derives pressure, SRB measures, and large deviations step by step. Ideal if you like explicit examples and phase-space pictures.
E. Ott — *Chaos in Dynamical Systems* (Cambridge, 2nd ed. 2002)	Section 6.4 ("Thermodynamic Formalism") gives a concise but insightful introduction, closely related to the equations you quoted.

📙 3. Advanced and specialized literature

If you later want to explore SRB measures, large deviations, or multifractals in more depth:

Reference	Focus
G. Keller — *Equilibrium States in Ergodic Theory* (Cambridge, 1998)	Rigorous yet readable treatment of pressure, equilibrium measures, and transfer operators.
H. H. Rugh — "Thermodynamic Formalism for Maps with Indifferent Fixed Points" (Nonlinearity, 1992)	Extends Ruelle–Bowen formalism beyond uniform hyperbolicity.
J.-P. Eckmann & D. Ruelle — *Ergodic Theory of Chaos and Strange Attractors*, Rev. Mod. Phys. 57, 617 (1985)	Classic review for physicists; connects Lyapunov exponents, SRB measures, and topological pressure.
T. C. Halsey et al., *Fractal Measures and Multifractal Spectra of Chaotic Attractors*, Phys. Rev. A 33, 1141 (1986)	Shows how multifractal $f(\alpha)$ spectra arise as Legendre transforms of pressure-like generating functions.

📘 4. Suggested reading path

If you want to understand it deeply but efficiently:

1. **Start with Ott (2002)** or **Tél & Gruiz (2006)** → for physical intuition and connection to Lyapunov exponents.
2. Then **read Gaspard (1998, Ch. 9)** → for the formal derivation of topological pressure and escape rates.
3. Finally, **work through Ruelle (1978)** → to see how it becomes a general mathematical theory (equilibrium states, variational principles, etc.).

🧩 5. Optional but very related topics

- **Large deviation theory** — e.g. Dembo & Zeitouni (1998): *Large Deviations Techniques and Applications.*
- **Multifractal formalism** — e.g. Falconer (2014): *Fractal Geometry*, Ch. 17.
- **SRB measures and chaotic attractors** — e.g. Young (2002): *What are SRB measures, and which dynamical systems have them?*, J. Stat. Phys.