History of Thermodynamics

Thermodynamics · Practice Test · 15 Questions

1. Which 1824 treatise by Sadi Carnot introduced the concept of the reversible heat engine cycle, forming the foundation of the second law of thermodynamics?

A) Reflections on the Motive Power of Fire
B) The Mechanical Theory of Heat
C) On the Equilibrium of Heterogeneous Substances
D) A Dynamical Theory of the Electromagnetic Field

2. Who coined the term 'entropy' in an 1865 paper, choosing the Greek root 'tropein' to signify 'transformation'?

A) Ludwig Boltzmann
B) Rudolf Clausius
C) James Prescott Joule
D) William Thomson

3. In 1847, Hermann von Helmholtz published 'Über die Erhaltung der Kraft', which is historically significant for providing the first rigorous mathematical formulation of which principle?

A) The Zeroth Law of Thermodynamics
B) The Third Law of Thermodynamics
C) The Conservation of Energy
D) The Equipartition Theorem

4. Which scientist is credited with resolving the 'Maxwell's Demon' paradox in 1929 by linking information theory to thermodynamic entropy?

A) Leo Szilard
B) Richard Feynman
C) John von Neumann
D) Werner Heisenberg

5. The 'Gibbs phase rule', which defines the degrees of freedom in a thermodynamic system, was published in which multi-part work between 1875 and 1878?

A) On the Motion of Dissolved Particles
B) Thermodynamic Properties of Steam
C) On the Equilibrium of Heterogeneous Substances
D) The Kinetic Theory of Gases

6. Which experiment conducted by James Prescott Joule in the 1840s famously demonstrated the mechanical equivalent of heat?

A) The falling weight calorimeter experiment
B) The oil drop experiment
C) The gold foil experiment
D) The torsion balance experiment

7. In 1906, Walther Nernst proposed what would become known as the Third Law of Thermodynamics, specifically concerning the behavior of entropy as what variable approaches zero?

A) Pressure
B) Volume
C) Temperature
D) Chemical Potential

8. The 'Loschmidt's paradox', which questions how the second law of thermodynamics can be derived from time-reversible microscopic laws, was proposed in what year?

A) 1852
B) 1876
C) 1894
D) 1901

9. Who was the first person to state the Zeroth Law of Thermodynamics explicitly in a textbook, long after its principles were implicitly used?

A) Ralph H. Fowler
B) Max Planck
C) Gustav Kirchhoff
D) Enrico Fermi

10. The development of the 'Equipartition Theorem' is largely attributed to James Clerk Maxwell, but which scientist first formulated it in 1845?

A) John James Waterston
B) Robert Mayer
C) William Rankine
D) Thomas Andrews

11. In 1851, William Thomson (Lord Kelvin) published a paper that contained the first official statement of the second law of thermodynamics. What was the title of this paper?

A) On the Dynamical Theory of Heat
B) On the Absolute Scale of Temperature
C) On the Dissipation of Mechanical Energy
D) On the Theory of the Steam Engine

12. Which scientist discovered the 'critical point' of carbon dioxide in 1869, proving that gases and liquids are continuous phases of matter?

A) Thomas Andrews
B) Johannes Diderik van der Waals
C) Benoît Paul Émile Clapeyron
D) Henri Victor Regnault

13. Ludwig Boltzmann's famous entropy formula S = k log W was engraved on his tombstone. In this equation, what does the constant 'k' represent?

A) Kelvin's constant
B) Boltzmann's constant
C) Stefan-Boltzmann constant
D) Avogadro's constant

14. The van der Waals equation of state, which accounts for non-zero molecular volume and intermolecular forces, was introduced in what year?

A) 1862
B) 1873
C) 1885
D) 1892

15. Who formulated the 'Clausius-Clapeyron relation' in 1834 to describe the phase transition between two states of matter?

A) Benoît Paul Émile Clapeyron
B) Sadi Carnot
C) James Prescott Joule
D) Gustav Kirchhoff