

0.1 Significant dates of thermodynamics' history

- 1802 Gay Lussac establishes the thermal expansion of gases
- 1819 Empirical law of Dulong et Petit on the specific heat of solids.
- 1824 Carnot sets the foundations of thermodynamics (Theoretical study of thermal efficiency of machines and introduction of reversible transformations)
- 1842 Mayer shows the equivalence between heat and mechanical energy.
- 1847 Helmholtz states the general law of energy conservation (mechanical, calorific, electric and magnetic).
- 1848 Kelvin introduce the scale of absolute temperatures.
- 1850 Statement of the second principle of thermodynamics by Clausius
- 1860 Kirshoff sets the thermodynamical foundations of radiation theory. Maxwell studies the kinetic gas theory and gives the distribution of molecular velocities.
- 1865 Clausius, Rankine and Kelvin define the entropy.
- 1860 -1877 Boltzmann and Gibbs set the foundations of classical statistical mechanics. In 1877, Boltzmann defines the entropy in terms of probabilities.
- 1879 Boltzmann establishes the relation $I = \sigma T^4$ between the radiation Intensity of a blackbody per unit area and the absolute temperature.

0.2 Important dates in the discovery of the electron and the atom

- 1828 G. Brown discovers with the microscope the "Brownian motion" (agitation of microscopic particles).
- 1869 Periodic classification of elements (Mendeleiev).
- 1869 First study of cathodic rays. Rays emitted by a hot cathode. They will be identified later as electrons. They propagate in straight line (Hittorf).
- 1879 Effect of a magnetic field on cathodic rays (Crookes).
- 1886 Discovery of (heavy channel-rays ions) by Goldskin.
- 1895 Discovery of X-rays (Röntgen).
- 1896 Building of the first ionization chamber to detect particles (Wilson).
- 1897 J.J. Thomson establishes the existence of the electron.
- 1898 Wilson shows that channel rays are heavy ions.
- 1905 Einstein makes the theory of Brownian motion.
- 1910 J. Perrin establishes the existence of atoms by verifying experimentally the predictions of Einstein for the Brownian motion.

0.3 Evolution of Optics ideas

1636 Snell discovers Descarte's laws...

1665 Study of diffraction by Grimaldi.

1666 By studying the eclipses of Jupiter's Satellites Roemer discovers that speed of light is finite.

1672 Newton's establishes the composite nature of white light.

1690 Huyghens sets the wave theory of light.

1704 Publication of Newton's Optics treatise which suggests in particular the corpuscular theory of light.

1800 Malus discovers the polarization of light by reflection.

1803 Young makes the first light interference experiments.

1814 (and after) Fresnel makes a systematic study of interference and diffraction and develops the wave theory of light, previously neglected because of the authority of Newton.

1819 Arago and Fresnel shows the light vibrations are transverse.

1829 Fizeau measures the speed of light.

1865 Maxwell's equations

1882 Set up of diffraction lattice by Roland.

1887 Michelson and Morley experiment. The earth motion do not influence the speed of light.

1887 -1893 Experimental study of radio waves by Hertz which confirms Maxwell's equations and establishes that light is an electromagnetic phenomenon.

1895 Discovery of X-rays (Röntgen).

1905 Einstein set the principles of special relativity.