

Topic Page: [cryogenics](#)

Definition: **cryogenics** from *Dictionary of Energy*

Physics. the branch of science that deals with the realm of extremely low temperatures and their effect on the properties of matter.

Summary Article: **cryogenics**

from *The Hutchinson Unabridged Encyclopedia with Atlas and Weather Guide*

Science of very low temperatures (sometimes approaching absolute zero), including the production of very low temperatures and the exploitation of special properties associated with them, such as the disappearance of electrical resistance (superconductivity).

Low temperatures can be produced by the Joule–Thomson effect (cooling a gas by making it do work as it expands). Gases such as oxygen, hydrogen, and helium may be liquefied in this way, and temperatures of 0.3 K can be reached. Further cooling requires magnetic methods; a magnetic material, in contact with the substance to be cooled and with liquid helium, is magnetized by a strong magnetic field. The heat generated by the process is carried away by the helium. When the material is then demagnetized, its temperature falls; temperatures of around 10^{-3} K have been achieved in this way. Much lower temperatures, of a few billionths of a kelvin above absolute zero, have been obtained by trapping gas atoms in an ‘optical molasses’ of crossed laser beams, which slow them down. At temperatures near absolute zero, materials can display unusual properties. Some metals, such as mercury and lead, exhibit superconductivity. Liquid helium loses its viscosity and becomes a ‘superfluid’ when cooled to below 2 K; in this state it flows up the sides of its container. Cryogenics has several practical applications. **Cryotherapy** is a process used in eye surgery, in which a freezing probe is briefly applied to repair a break in the retina. Electronic components called Josephson junctions, which could be used in very fast computers, need low temperatures to function. Magnetic levitation (maglev) systems must be maintained at low temperatures. Food can be frozen for years, and freezing eggs, sperm, and pre-embryos is now routine.

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Cryogenics. (2018). In Helicon (Ed.), *The Hutchinson unabridged encyclopedia with atlas and weather guide*. Abington, UK: Helicon. Retrieved from <https://search.credoreference.com/content/topic/cryogenics>



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"cryogenics." *The Hutchinson Unabridged Encyclopedia with Atlas and Weather Guide*, edited by Helicon, 2018. *Credo Reference*, <https://search.credoreference.com/content/topic/cryogenics>. Accessed 27 Jun. 2019.