**TECH-NEWS**

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**Presents Technological Update On**

**Cryogenics**

by

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**Introduction**

Cryogenics is the branches of physics and engineering that involve the study of very low temperatures, how to produce them, and how materials behave at those temperatures. In [physics](https://en.wikipedia.org/wiki/Physics), cryogenics is the study of the production and behaviour of materials at very low [temperatures](https://en.wikipedia.org/wiki/Temperatures). It is not well-defined at what point on the temperature scale [refrigeration](https://en.wikipedia.org/wiki/Refrigeration) ends and cryogenics begins, but scientists.Assume it starts at or below −150 [°C](https://en.wikipedia.org/wiki/Celsius) (123 [K](https://en.wikipedia.org/wiki/Kelvin); −238 [°F](https://en.wikipedia.org/wiki/Fahrenheit)). The U.S. [National Institute of Standards and Technology](https://en.wikipedia.org/wiki/National_Institute_of_Standards_and_Technology) has chosen to consider the field of cryogenics as those involving temperatures below −180 °C or −292.00 °F or 93.15 K. This is a logical dividing line, since the normal [boiling points](https://en.wikipedia.org/wiki/Boiling_point) of the so-called permanent [gases](https://en.wikipedia.org/wiki/Gases) (such as [helium](https://en.wikipedia.org/wiki/Helium), [hydrogen](https://en.wikipedia.org/wiki/Hydrogen), [neon](https://en.wikipedia.org/wiki/Neon), [nitrogen](https://en.wikipedia.org/wiki/Nitrogen), [oxygen](https://en.wikipedia.org/wiki/Oxygen), and normal [air](https://en.wikipedia.org/wiki/Earth%27s_atmosphere)) lie below −180 °C while the [Freon](https://en.wikipedia.org/wiki/Freon) refrigerants, [hydrogen sulphide](https://en.wikipedia.org/wiki/Hydrogen_sulfide), and other common refrigerants have boiling points above −180 °C. (above −150 °C, −238 °F or 123).

A person who studies elements that have been subjected to extremely cold temperatures is called a ryogenicist. Cryogenicists use the [Kelvin](https://en.wikipedia.org/wiki/Kelvin) or [Rankine](https://en.wikipedia.org/wiki/Rankine_scale) temperature scales.

Cryogenic fluids with their boiling point in kelvin (Liquid Helium3- 3.19k), (Liquid Helium4- 4.214k),(Liquid Hydrogen- 20.27k), (Liquid Neon-27.09k),(Liquid Nitrogen- 77.36k), (Liquid Air- 78.8k), (Liquid Fluorine- 85.24k), (Liquid Argon- 87.24k),(Liquid Oxygen- 90.18), (Liquid Methane- 111.7k)

**Key Feature**

1. A Cryogenic is more efficient and provides more thrust for every kilogram of propellant it burns compared to solid and earth-storable liquid propellant rocket stages.

2. Specific impulse (a measure of the efficiency) achievable with cryogenic propellants (liquid Hydrogen and liquid Oxygen) is much higher compared to earth storable liquid and solid propellants, giving it a substantial payload advantage.

**R & D Prospects**

1. Application of Cryogenic to enhance the cryogenic engine technology.
2. Research Experimental research on certain physics phenomena, such as spintronics and magneto transport properties, requires cryogenic temperatures for the effects to be observed
3. Cryogenic cooling is used to cool the tool tip at the time of machining. It increases the tool life. Oxygen is used to perform several important functions in the steel manufacturing process.