

2  
**He**  
Helium  
4.003

**Key Properties**

Atomic Mass	4.003
Category	Noble Gases
State at 20°C	gas
Melting Point	null
Boiling Point	-268.928°C
Density	0.178 g/L
Electron Config	1s <sup>2</sup>
Electronegativity	null
Year Discovered	1895
Discovered By	"Pierre Janssen, Norman Lockyer (Detection); Sir William Ramsay, Cleve,

**Did You Know?**

- 1 It was first discovered not on Earth, but by observing the Sun's spectrum during a solar eclipse in 1868.
- 2 It is the only element that cannot be solidified by cooling it at normal atmospheric pressure; it requires immense pressure to freeze.
- 3 The high-pitched \
- 4 Helium is a non-renewable resource on Earth, formed by the radioactive decay of uranium and thorium deep underground.
- 5 Liquid helium is one of the coldest substances on Earth, used to cool the superconducting magnets in MRI machines.

**APPEARANCE**

A colorless, odorless, tasteless inert gas.

**SUPERHERO PERSONA**

"The Escapist, a lighter-than-air hero who can lift anything and always makes a high-pitched exit."

**EVERYDAY CONNECTION**

The floating balloons at a birthday party.

**POP CULTURE**

The element that gives characters a squeaky voice in cartoons.

**Overview of Helium**

Helium is a colorless, odorless, and inert noble gas with atomic number 2. It is the second most abundant element in the universe, produced in stars through nuclear fusion, and it plays a critical role in both science and industry. On Earth, it is best known as the gas that makes balloons float, but its unique physical properties make it invaluable in medicine, research, and technology.

**Uses of Helium**

Helium's usefulness comes from its inert nature and extremely low boiling point (-268.9 °C, just above absolute zero):

**Cryogenics:** The largest use of helium is as a coolant for superconducting magnets, including those in MRI scanners and the Large Hadron Collider. It was also vital in the Apollo program to keep liquid hydrogen and oxygen rocket fuel cold.

**Lifting gas:** Being lighter than air and non-flammable, helium safely fills balloons, airships, and weather balloons, replacing hydrogen, which is dangerously explosive.

**Inert atmosphere:** Helium is used in arc welding, semiconductor manufacturing, and fiber optics production, where it prevents oxidation and contamination.

**Leak detection:** Thanks to its tiny atomic size, helium is used in leak detection systems, such as testing car air conditioners and high-vacuum systems.

**Breathing mixtures:** A mix of helium and oxygen, called heliox, is used by deep-sea divers to reduce the risk of decompression sickness ("the bends").

**Natural Occurrence and Production of Helium**

Although helium is the second most abundant element in the universe, it is relatively rare on Earth.

**Formation:** Helium on Earth is formed through the radioactive decay of heavy elements, which release alpha particles that become helium atoms.

**Extraction:** Most commercial helium is obtained from natural gas deposits, where concentrations can reach up to 7%. Extracting helium from the atmosphere is impractical because its concentration is only about 0.0005%.

**History of Helium**

1868 – **Discovery in the Sun:** Astronomer Pierre Janssen observed a mysterious yellow spectral line during a solar eclipse. British astronomer Norman Lockyer identified it as a new element and named it helium after the Greek word for the sun, helios.

1895 – **Discovery on Earth:** Swedish chemists Per Teodor Cleve and Nils Abraham Langlet detected helium in a uranium mineral called cleveite, proving it existed on Earth.

**Biological Role of Helium**

Helium has no biological role and is inert in the human body. It is non-toxic, but inhaling pure helium displaces oxygen, which can cause asphyxiation. Small amounts are sometimes inhaled from balloons for its voice-changing effect, though this can be dangerous in excess.

thepredictable.in