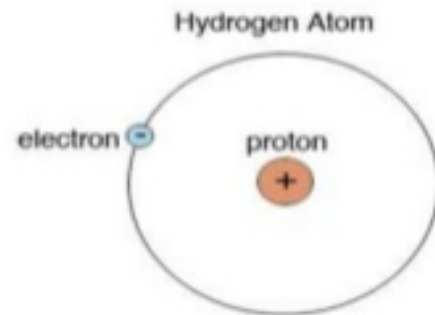


Hydrogen & Helium

Dr. A. Balamurugan

Properties of Hydrogen

- Hydrogen is the smallest chemical elements.
- Hydrogen is the lightest element, hydrogen is less dense than air.
- Hydrogen is the most abundant chemical substance in the universe, especially in stars and gas giant planets.
- Hydrogen is a nontoxic, non-metallic, odourless, tasteless, colourless, and highly combustible.
- Hydrogen gas is made up of diatomic molecules designated as H_2 .
- Hydrogen is also prevalent on Earth in the form of chemical compounds such as hydrocarbons and water.



1	←	atomic number
H	←	element symbol
Hydrogen	←	element name
1.008	←	atomic weight

Why it's called Hydrogen?

How was it discovered?

English scientist Henry Cavendish discovered hydrogen as an element in 1766. Cavendish ran an experiment using zinc and hydrochloric acid. He discovered hydrogen and also found that it produced water when it burned.



Where did hydrogen get its name?

The name hydrogen comes from the Greek words "hydro" (meaning water) and "genes" (meaning creator). It was named by French chemist Antoine Lavoisier because when it burns it "creates water".

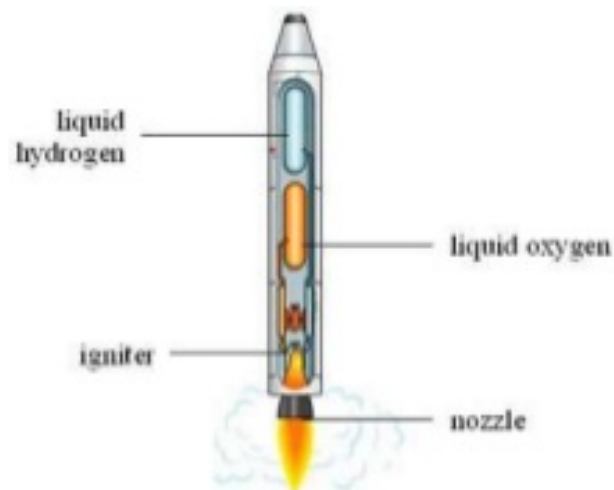


How is Hydrogen used today?

Hydrogen is a very useful element. It is used to make:

- ammonia for fertilizers
- refining metals
- methanol for making artificial material like plastics

Hydrogen is also used as a rocket fuel where liquid hydrogen is combined with liquid oxygen to produce a powerful explosion. Scientists hope that someday hydrogen can be used as a clean fuel alternative to gasoline.

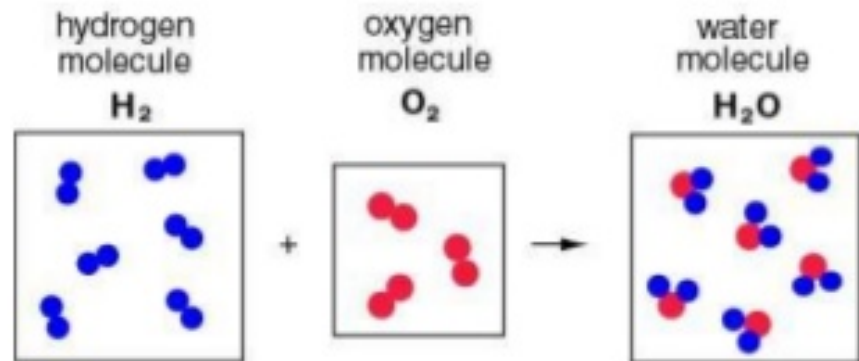


Hydrogen on Earth

- The most common place to find hydrogen on earth is in water. Each water molecule (H_2O) contains two hydrogen atoms and one oxygen atom.
- Hydrogen is also found in a wide range of compounds throughout the earth including hydrocarbons, acids, and hydroxides.

There is very little free hydrogen in the Earth's atmosphere because it is so light that it eventually escapes into space. The only free hydrogen on earth is deep underground.

Hydrogen burns when it comes into contact with oxygen, The by-product of a hydrogen and oxygen explosion is water or H_2O .



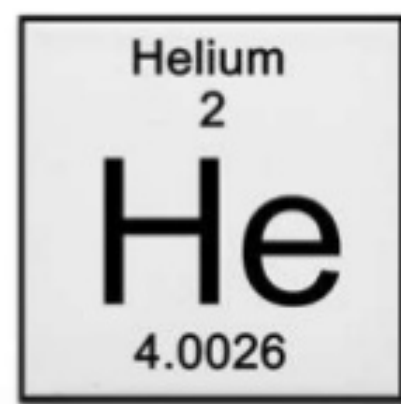
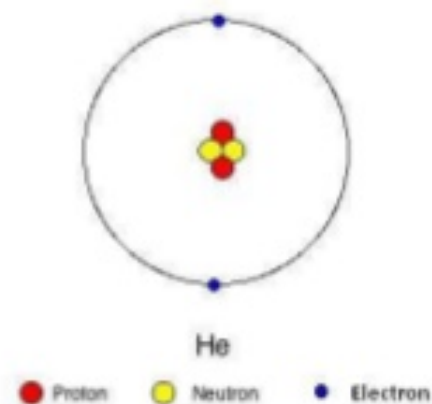
Hydrogen in Stars and Planets

- Hydrogen is found mostly in stars and gas giant planets.
- The Sun is made up of mostly hydrogen.
- Deep inside stars, the pressure is so high that **hydrogen atoms are converted to helium atoms**. This conversion is called fusion and it releases heat and energy that we see as sunlight.



Properties of Helium

- At room temperature helium is an odourless, tasteless, colourless gas.
- It has very low boiling and melting points, meaning that it is generally found in the gas phase except under the most extreme of conditions.
- Helium is the only element that does not solidify under ordinary pressures and remains a liquid even at absolute zero.
- Helium is very unreactive and non-flammable.



Why it's called Helium?

How was it discovered?

Helium was first discovered in 1868 by astronomer Pierre Janssen. He noticed the new element when studying a solar eclipse. The element wasn't found on Earth until 1895.



Where did helium get its name?

Helium gets its name from the Greek word "helios" meaning "sun". Helios is also the name of the Greek god of the Sun.



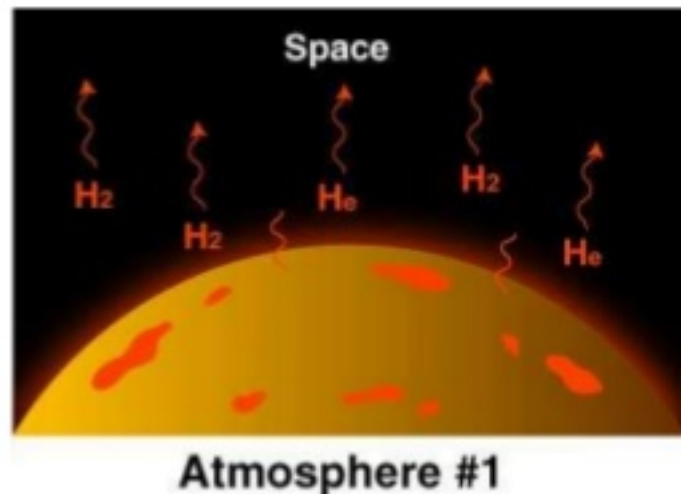
How is Helium used today?

- Helium is used in balloons and airships to make them float. It is not as light as hydrogen, but is a much safer gas as hydrogen is very flammable.
- Use Helium to keep the superconducting magnets cool.



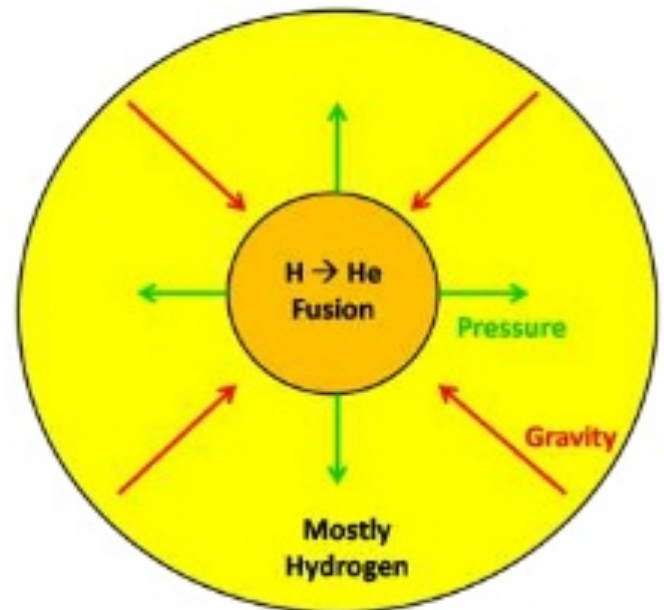
Helium on Earth

- Helium is fairly rare on Earth. There is very little in the Earth's atmosphere because it is so light that it eventually escapes into outer space.
- Scientists believe that most of the helium in the universe was created at the formation of the universe.
- new helium is created in the centre of stars and also as part of radioactive decay on Earth.
- Helium from radioactive decay can be found trapped underground in natural gas reservoirs.



Helium in Stars

Helium is constantly being produced at the internal cores of stars. Deep inside a star, intense pressures cause hydrogen atoms to convert into helium atoms. This creates the energy, heat, and light that powers the stars and the sun. This conversion is called nuclear fusion.



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Thank

You