

= Period 1 element =

A period 1 element is one of the chemical elements in the first row ( or period ) of the periodic table of the chemical elements . The periodic table is laid out in rows to illustrate recurring ( periodic ) trends in the chemical behaviour of the elements as their atomic number increases : a new row is begun when chemical behaviour begins to repeat , meaning that elements with similar behaviour fall into the same vertical columns . The first period contains fewer elements than any other row in the table , with only two : hydrogen and helium . This situation can be explained by modern theories of atomic structure . In a quantum mechanical description of atomic structure , this period corresponds to the filling of the 1s orbital . Period 1 elements obey the duet rule in that they need two electrons to complete their valence shell . The maximum number of electrons that these elements can accommodate is two , both in the 1s orbital . Therefore , period 1 can have only two elements .

= = Periodic trends = =

All other periods in the periodic table contain at least 8 elements , and it is often helpful to consider periodic trends across the period . However , period 1 contains only two elements , so this concept does not apply here .

In terms of vertical trends down groups , helium can be seen as a typical noble gas at the head of Group 18 , but as discussed below , hydrogen 's chemistry is unique and it is not easily assigned to any group .

= = Position of period 1 elements in the periodic table = =

Although both hydrogen and helium are in the s-block , neither of them behaves similarly to other s-block elements . Their behaviour is so different from the other s-block elements that there is considerable disagreement over where these two elements should be placed in the periodic table .

Hydrogen is sometimes placed above lithium , above carbon , above fluorine , above both lithium and fluorine ( appearing twice ) , or left floating above the other elements and not assigned to any group in the periodic table .

Helium is almost always placed above neon ( which is in the p-block ) in the periodic table as a noble gas , although it is occasionally placed above beryllium due to their similar electron configuration .

= = Elements = =

= = = Hydrogen = = =

Hydrogen ( H ) is the chemical element with atomic number 1 . At standard temperature and pressure , hydrogen is a colorless , odorless , nonmetallic , tasteless , highly flammable diatomic gas with the molecular formula H<sub>2</sub> . With an atomic mass of 1.00794 amu , hydrogen is the lightest element .

Hydrogen is the most abundant of the chemical elements , constituting roughly 75 % of the universe 's elemental mass . Stars in the main sequence are mainly composed of hydrogen in its plasma state . Elemental hydrogen is relatively rare on Earth , and is industrially produced from hydrocarbons such as methane , after which most elemental hydrogen is used " captive " ( meaning locally at the production site ) , with the largest markets almost equally divided between fossil fuel upgrading , such as hydrocracking , and ammonia production , mostly for the fertilizer market . Hydrogen may be produced from water using the process of electrolysis , but this process is significantly more expensive commercially than hydrogen production from natural gas .

The most common naturally occurring isotope of hydrogen , known as protium , has a single proton

and no neutrons . In ionic compounds , it can take on either a positive charge , becoming a cation composed of a bare proton , or a negative charge , becoming an anion known as a hydride . Hydrogen can form compounds with most elements and is present in water and most organic compounds . It plays a particularly important role in acid @-@ base chemistry , in which many reactions involve the exchange of protons between soluble molecules . As the only neutral atom for which the Schrödinger equation can be solved analytically , study of the energetics and spectrum of the hydrogen atom has played a key role in the development of quantum mechanics .

The interactions of hydrogen with various metals are very important in metallurgy , as many metals can suffer hydrogen embrittlement , and in developing safe ways to store it for use as a fuel . Hydrogen is highly soluble in many compounds composed of rare earth metals and transition metals and can be dissolved in both crystalline and amorphous metals . Hydrogen solubility in metals is influenced by local distortions or impurities in the metal crystal lattice .

= = = Helium = = =

Helium ( He ) is a colorless , odorless , tasteless , non @-@ toxic , inert monatomic chemical element that heads the noble gas series in the periodic table and whose atomic number is 2 . Its boiling and melting points are the lowest among the elements and it exists only as a gas except in extreme conditions .

Helium was discovered in 1868 by French astronomer Pierre Janssen , who first detected the substance as an unknown yellow spectral line signature in light from a solar eclipse . In 1903 , large reserves of helium were found in the natural gas fields of the United States , which is by far the largest supplier of the gas . The substance is used in cryogenics , in deep @-@ sea breathing systems , to cool superconducting magnets , in helium dating , for inflating balloons , for providing lift in airships , and as a protective gas for industrial uses such as arc welding and growing silicon wafers . Inhaling a small volume of the gas temporarily changes the timbre and quality of the human voice . The behavior of liquid helium @-@ 4 's two fluid phases , helium I and helium II , is important to researchers studying quantum mechanics and the phenomenon of superfluidity in particular , and to those looking at the effects that temperatures near absolute zero have on matter , such as with superconductivity .

Helium is the second lightest element and is the second most abundant in the observable universe . Most helium was formed during the Big Bang , but new helium is being created as a result of the nuclear fusion of hydrogen in stars . On Earth , helium is relatively rare and is created by the natural decay of some radioactive elements because the alpha particles that are emitted consist of helium nuclei . This radiogenic helium is trapped with natural gas in concentrations of up to seven percent by volume , from which it is extracted commercially by a low @-@ temperature separation process called fractional distillation .