

What Atoms Look Like

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Abstract- Atoms are made up of protons and neutrons. Protons and neutrons are the smallest particles of matter. Electrons aren't matter.

There are about 100 elements in the world. The elements are numbered according to increasing atomic weight. These numbers are the atomic numbers of the elements.

Atoms of an element may have different masses. An isotope is all the atoms of an element having the same mass.

All atoms have masses that are close to whole numbers. The whole number closest to the mass of the atoms of an isotope is the mass number of that isotope.

Protons and neutrons have the same mass. Protons and neutrons are the smallest particles of matter.

Hydrogen is element 1. There are two stable isotopes of hydrogen, hydrogen-1 and hydrogen-2. There is also one unstable isotope of hydrogen, hydrogen-3.

A hydrogen-1 atom consists of a single proton.

A hydrogen-2 atom is made up of a proton and a neutron. A hydrogen-2 atom is known as a deuteron.

A hydrogen-3 atom is made up of one proton and two neutrons. A hydrogen-3 atom is known as a triton.

Helium is element 2. There are two stable isotopes of helium, helium-3 and helium-4. A helium-3 atom is made up of a proton and a deuteron. A helium-4 atom is made up of two deuterons.

Lithium is element 3. There are two stable isotopes of lithium, lithium-6 and lithium-7. A lithium-6 atom is made up of three deuterons. A lithium-7 atom is made up of two deuterons and one triton.

Atoms are made up of deuterons and tritons (except for hydrogen-1 and helium-3 atoms, which contain single protons). The total number of deuterons and tritons in an atom of an element is equal to the atomic number of the element.

Beryllium is element 4. There is one stable isotope of beryllium, beryllium-9. A beryllium-9 atom is made up of three deuterons and one triton.

Atoms make bonds with other atoms to form molecules. The number of bonds that an atom of an element makes with other atoms is the valence of that element.

The first row of the periodic table contains two elements, hydrogen and helium. Hydrogen has a valence of one. Helium has a valence of zero. Helium atoms don't make bonds with other atoms.

The second row of the periodic table contains eight elements. The valences of these eight elements are:

1 2 3 4 3 2 1 0

Carbon is element 6. Carbon has a valence of 4. A carbon-12 atom is made up of 6 deuterons. A carbon-12 atom is a helium-4 atom surrounded by four deuterons. The four deuterons are located at the corners of a tetrahedron. Each of these four deuterons makes one bond with another atom.

Nitrogen is element 7. Nitrogen has a valence of 3. A nitrogen-14 atom is made up of 7 deuterons. A nitrogen-14 atom is a helium-4 atom surrounded by three single deuterons and a pair of deuterons. The three single deuterons each make one bond with another atom.

Neon is element 10. A neon-20 atom is made up of 10 deuterons. A neon-10 atom is a helium-4 atom surrounded by four pairs of deuterons. The four pairs of deuterons are located at the corners of a tetrahedron.

The elements helium, neon, argon, krypton, xenon, and radon all have a valence of zero. These six elements all exist as gases at room temperature. They make up a family of elements known as the noble gas family.

Argon is element 18. An argon atom is made up of 18 deuterons and tritons. At the middle of an argon atom is a helium atom. The helium atom is surrounded by eight pairs of deuterons and tritons. The eight pairs are located at the corners of the cube.

Krypton is element 36. At the middle of a krypton atom is an argon atom. The argon atom is surrounded by six triplets of deuterons and tritons. The six triplets are located at the corners of an octahedron.

Xenon is element 54. At the middle of a xenon atom is an argon atom. The argon atom is surrounded by twelve triplets of deuterons and tritons. The twelve triplets are located at the corners of an icosahedron.

Radon is element 86. At the middle of a radon atom is a xenon atom. The xenon atom is surrounded by eight quartets of deuterons and tritons. The eight quartets are located at the corners of a cube.