

Isotopes

Each element has a unique atomic structure with a specific number of protons. The number of protons determines the element's atomic number. Atoms have the same number of electrons as they do protons. An isotope is an atom that has the same number of protons and electrons, but a different number of neutrons.

All elements have isotopes. Hydrogen only has three: Protium (no neutrons), Deuterium (one neutron), and Tritium (two neutrons). Hydrogen is the only element whose isotopes have been given specific names. Cesium and Xenon have the most known isotopes, with 36 each.

Changing the number of neutrons in an atom does not change its chemistry, since neutrons do not have an electrical charge. But changing the number of neutrons does change the element's mass. Therefore, isotopes are identified by their mass, which is the total number of protons and neutrons combined.

Isotopes can be written in two ways. Both methods refer to the mass of the atom (the number of protons plus the number of neutrons). The first way is to write the mass in superscript before the element's symbol. For example, Tritium, discussed above, would be written ^3H : it is an isotope of Hydrogen with an atomic mass of three (one proton and two neutrons). The second way is to write out the name of the element and add a dash and then the mass after the element's name: Hydrogen-3.

Isotopes are either stable or unstable. Unstable isotopes decay over time and eventually turn into another isotope or element. Unstable isotopes are considered radioactive. Most elements in nature, though, are comprised of stable isotopes. All man-made elements are radioactive isotopes. Twenty-six elements only have one stable isotope. These elements are called monoiso-topic.

