

Make 3-D Models of Isotopes

Kits for Kids

Ingredients

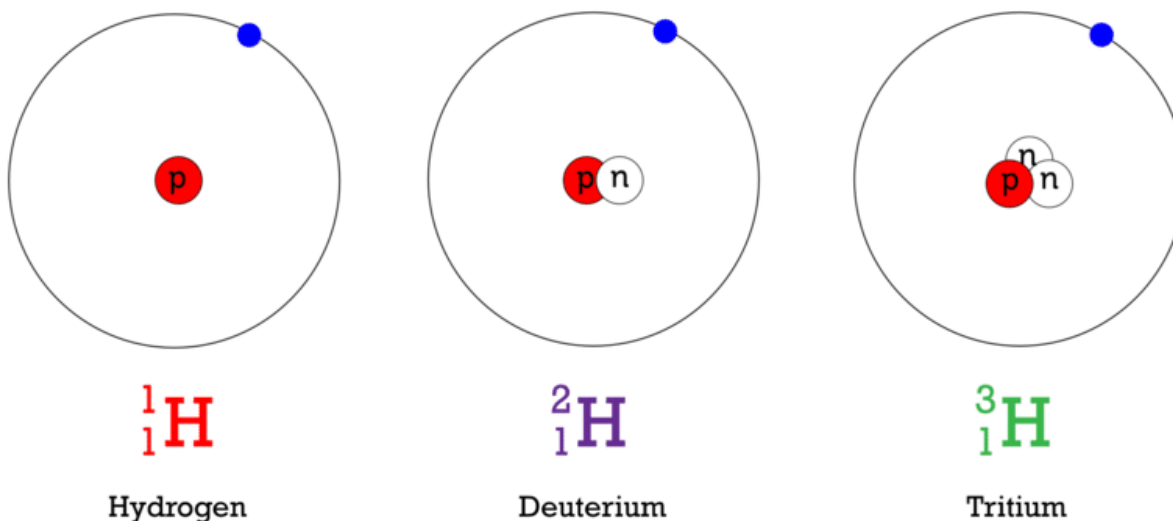
- Gummy Bears and marshmallows
- Toothpicks
- Wire (optional)
- Plastic Straw (optional)

Description

Models that can be touched are called physical models. You will make physical models of isotopes to help explain the difference between mass number and atomic number and the difference between quark structure of a neutron and a proton.

Begin by studying pictures of the three isotopes of hydrogen. Hydrogen is the simplest and lightest element. Ordinary hydrogen has one proton, one electron, and no neutrons. In the two other hydrogen isotopes, the nucleus has one or two neutrons in addition to the proton.

Now use your imagination (and whatever materials are handy) to make a 3-D model of each isotope. One way would be to use big marshmallows for protons and neutrons, which are big (compared to elementary particles) and about the same size. Darken or color the marshmallows that represent neutrons. In the deuterium and tritium models, stick the protons and neutrons together tightly.



1 Proton	1 Proton	1 Proton
1 Electron	1 Electron	1 Electron
Atomic Number = 1	1 Neutron	2 Neutrons
Mass Number = 1	Atomic Number = 1	Atomic Number = 1
	Mass Number = 2	Mass Number = 3

Modeling the electron physically is tricky. Electrons are constantly moving like race cars on a track. Also, electrons move very far from the nucleus. Strictly speaking, you might need to put the electron on the other side of town to show the proper distance in relation to your model of the nucleus.

If you cannot figure out a good way to represent the electron's movement around the nucleus, just use a piece of wire or a clear plastic drinking straw to attach the electron to your model. You might use gummy bears for the electrons, which are much smaller than the protons and neutrons. The electron is so small that no one has ever been able to measure its size.

When you display your models to your instructor, be prepared to show that you understand the terms nucleus, proton, neutron, electron, isotope, atomic number, and mass number. Also show that you know the electron is constantly moving, and (despite the straw or wire in your model) isn't physically fastened to the nucleus.

You might try other materials to make your models, such as balls of clay, painted balls of polystyrene foam, or different-sized marshmallows or candies.

If you wish, you can make models of three isotopes of an element other than hydrogen. Try carbon-12, carbon-13, and carbon-14. These models will be considerably bigger and will require more materials than models of hydrogen.