

Isotopes

35.5

Cl

17



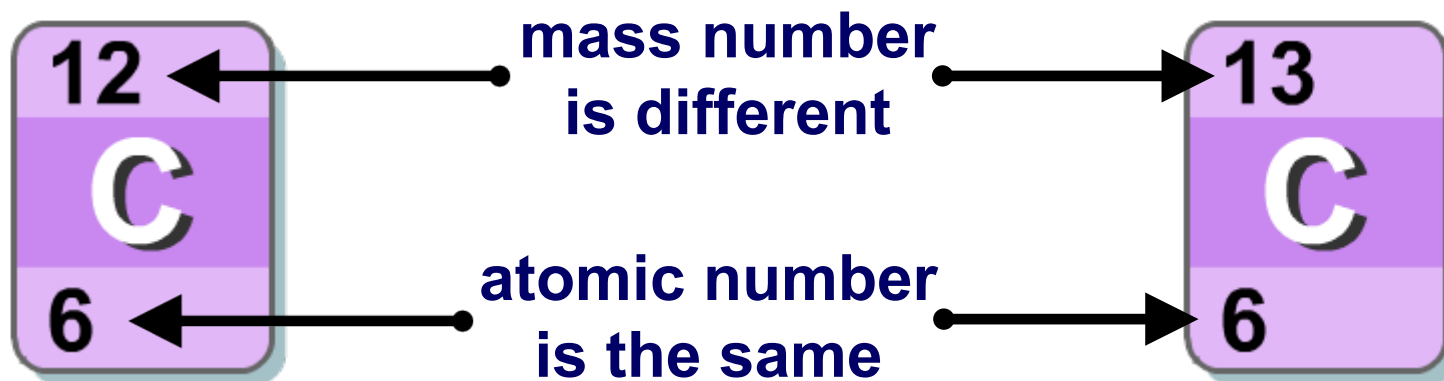
What is an isotope?

Elements are made up of one type of atom, but there can be slightly different forms of the atoms in an element.

Although atoms of the same element **always** have the same number of protons, they may have different numbers of neutrons.

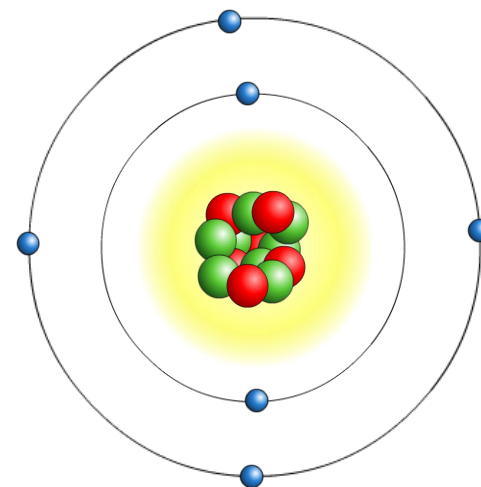
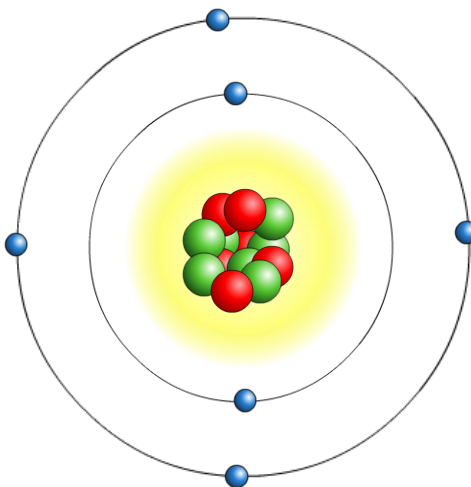
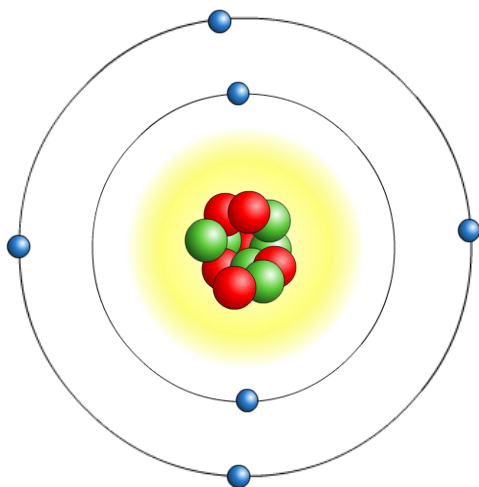
Atoms that differ in this way are called **isotopes**.

For example, two isotopes of carbon:



What are the isotopes of carbon?

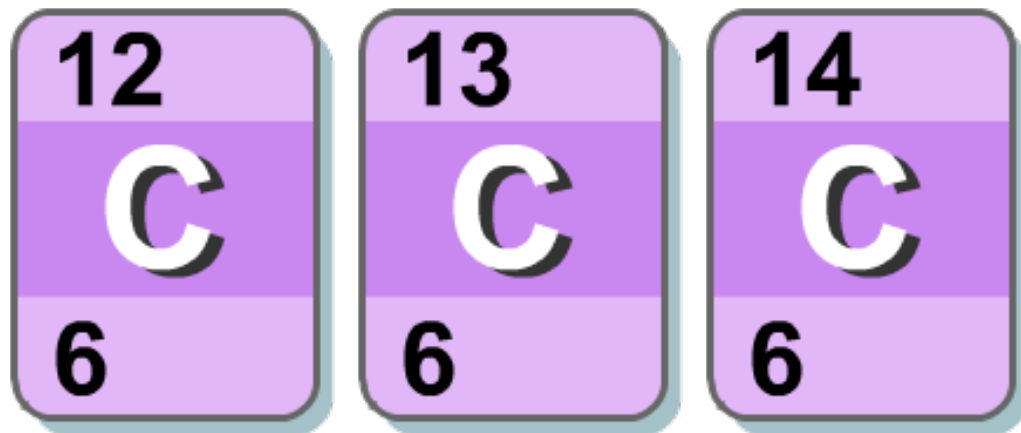
Most naturally-occurring carbon exists as carbon-12, about 1% is carbon-13, and a much smaller amount is carbon-14.



Properties of isotopes

The isotopes of an element are virtually identical in their chemical reactions.

This is because they have the same number of protons and the same number of electrons.



The uncharged neutrons make little difference to chemical properties but do affect physical properties such as melting point and density.

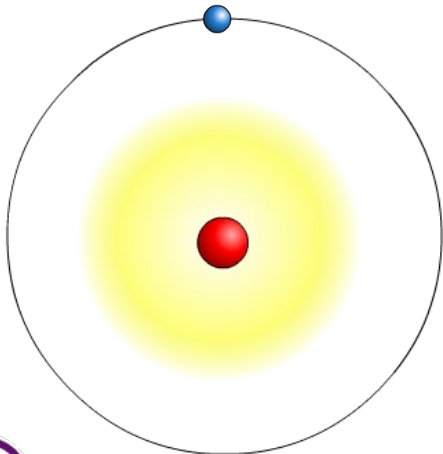
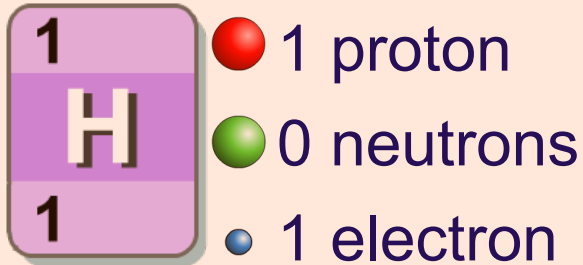
Natural samples of elements are often a mixture of isotopes.



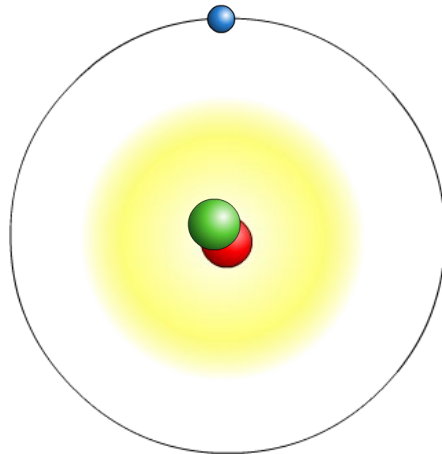
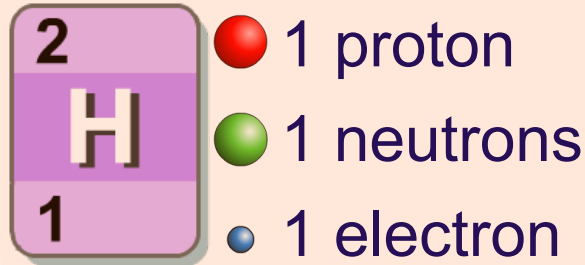
What are the isotopes of hydrogen?

Hydrogen-1 makes up the vast majority of the naturally-occurring element, but two other isotopes exist.

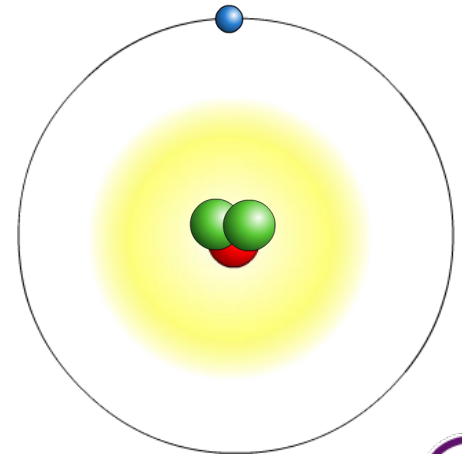
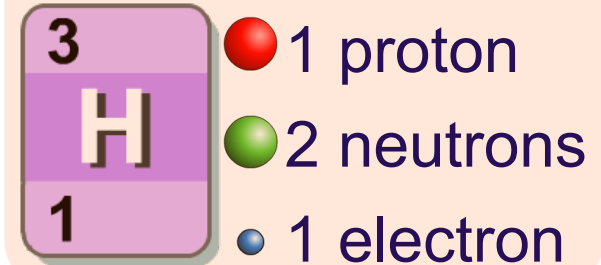
hydrogen



deuterium



tritium



What are the isotopes of chlorine?

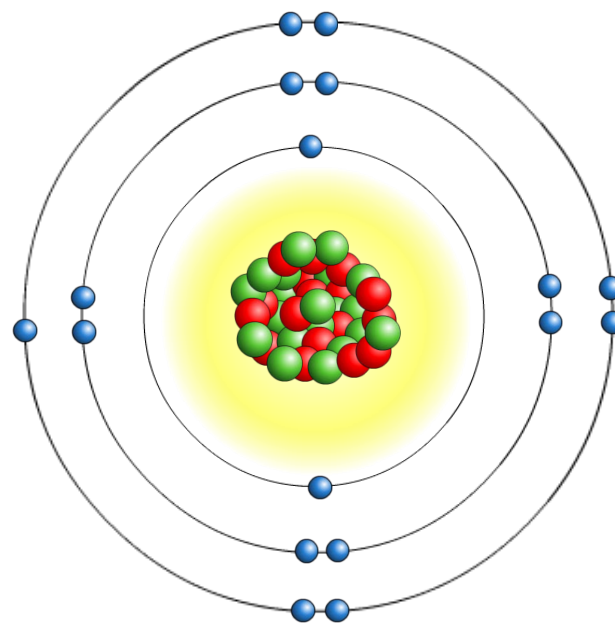
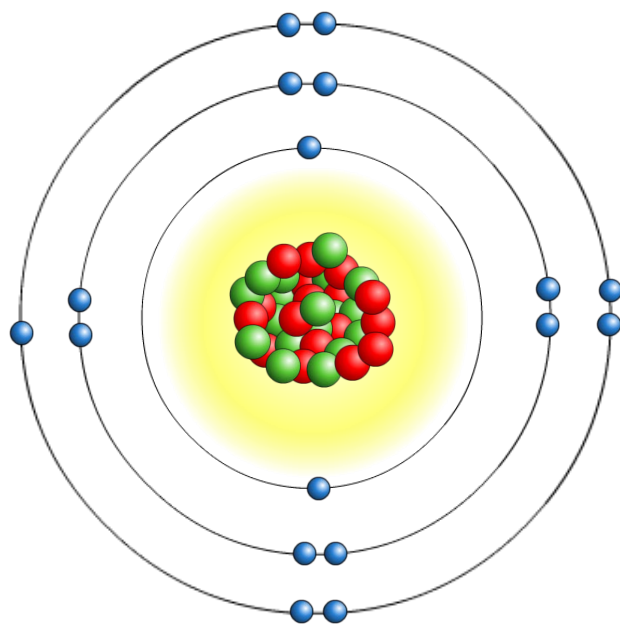
About 75% of naturally-occurring chlorine is chlorine-35 and 25% is chlorine-37.



- 17 protons
- 18 neutrons
- 17 electrons



- 17 protons
- 20 neutrons
- 17 electrons

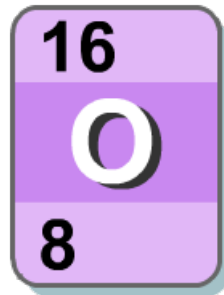





What are the isotopes of oxygen?

Almost all of naturally-occurring oxygen is oxygen-16, but about 0.2% is oxygen-18.

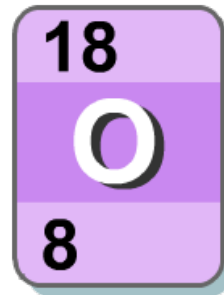
What are the particle numbers in each isotope below?




oxygen-16



-  8 protons
-  8 neutrons
-  8 electrons

oxygen-18



-  8 protons
-  10 neutrons
-  8 electrons



Isotopes – true or false?

