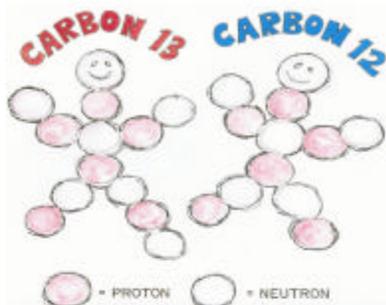


Stable isotopes are useful tools for scientific research

Stable Isotopes are like identical twins - they are almost exactly the same, but not quite... For instance, the element CARBON comes in two forms:



Carbon 13 is heavier than Carbon 12 by one neutron



^{13}C Carbon has one more neutron than ^{12}C Carbon in its nucleus



In most cases, ^{12}C Carbon and ^{13}C Carbon behave the same because extra neutrons don't change the reactive sphere of electrons around the nucleus



Sometimes the extra neutron makes a difference. It's harder to push the heavy molecules up an energy hill...



...so that products have more of the light isotope and less of the heavy isotope. We call this:

ISOTOPE DISCRIMINATION

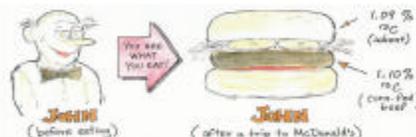


In fact, you would not be able to discriminate between ^{12}C and ^{13}C , but fancy machines like the mass spectrometer in this room can, and so can plants. Plants discriminate against ^{13}C when they take up CO_2 from the air during photosynthesis.



These plants are labeled by their ^{13}C contents. People who eat corn have more ^{13}C than people who eat wheat. Why? Because as far as people and stable isotopes go,

You are what you eat!



Stable isotopes have been used to tell whether ancient civilizations ate corn, to take the temperature of the oceans, to trace plumes of acid rain, and to establish when life appeared on earth. We do a little of each in this room.

