


Last Day...

Isotopes: Atoms with the same number of protons, but different numbers of neutrons.

There are tables of the isotopes for every element, whether or not they are naturally occurring or man-made and how they decay, radioactively.

 https://www.chem.ualberta.ca/~massspec/atomic_mass_abund.pdf

Example

Relative abundance - Is this a natural sample? *How do we know?*

A sample of oxygen contains: ^① Natural sample ^② predicted # of atoms

200 atoms of oxygen-16 99.762% 229

5 atoms of oxygen-17 0.038%

25 atoms of oxygen-18 0.2%

① $200 + 5 + 25 = 230$ atoms

$$\text{predicted \#} = \frac{\text{total \#} \times \%}{100}$$

$$^{16}\text{O} \quad \text{predicted \#} = \frac{230 \times 99.762}{100} = 229.45 \quad \text{round to whole number}$$

$$^{17}\text{O} \quad \text{predicted \#} = \frac{230 \times 0.038}{100} = 0.088$$

$$^{18}\text{O} \quad \text{predicted \#} = \frac{230 \times 0.2}{100} = 0.46$$

229

maybe one of those 2.

No This isn't a natural sample.
There are too much ^{17}O and ^{18}O

Example

Expected amounts from natural samples

A natural oxygen sample contains 10 000 oxygen atoms. What isotopes of oxygen are present and how many atoms of each?

$$\text{Predicted \#} = \frac{\# \text{ atoms} \times \%}{100}$$

$${}^{16}\text{O} \Rightarrow \text{Predicted \#} = \frac{10000 \times 99.762}{100} = 9976.2$$

$${}^{16}\text{O} - 99.762\%$$

$${}^{17}\text{O} - 0.038\%$$

$${}^{18}\text{O} - 0.2\%$$

$${}^{17}\text{O} \Rightarrow \text{Predicted} = \frac{10000 \times 0.038}{100} = 3.8 \rightarrow 4$$

$${}^{18}\text{O} \Rightarrow \text{Predicted} = \frac{10000 \times 0.2}{100} = 20$$

$$9976 + 4 + 20 = 10000 \quad \checkmark$$

Your turn

A natural sample of lithium contains 500 atoms.

What different isotopes would you expect to find,

Lithium \leftarrow and how many of each?



$$\frac{500 \times 7.59\%}{100} = 38$$

$$\frac{500 \times 92.41\%}{100} = \underline{\underline{462}}$$

Ion worksheet

1st 4 or 5 for Monday,
Complete the ion worksheet.

When you're done....

Build your own nucleus

phet.colorado.edu/sims/html/build-a-nucleus/latest/build-a-nucleus_all.html

