Answer on Question #54695 – Chemistry – General Chemistry

Question:

A sample of naturally occurring silicon consists Si-28 (amu = 27.9769), Si-29 (amu = 28.9765) and Si-30 (amu = 29.9738). If the atomic mass of silicon is 28.0855 and the natural abundance of Si-29 is 4.67%, what are the natural abundances of Si-28 and Si-30?

If you could explain how to solve this it would be greatly appreciated.

Answer:

Let the abundance of Si-28 be x%, the abundance of Si-30 is (1 - 0.0467 - x). The mass of the sample is the weighted average of the three constituents.

28.9765*0.0467 + 27.9769*x + 29.9738*(1 - 0.0467 - x) = 28.0855

=> 28.9765*0.0467 + 27.9769*x + 29.9738*0.9533 - 29.9738*x = 28.0855

=> 27.9769*x - 29.9738*x = 28.0855 - 28.9765*0.0467 - 29.9738*0.9533

=> x*-1.9969 = -1.84173

=> x = 0.9223

1 - x - 0.0467 = 0.031

The abundance of **Si-28** is **92.23%** and the abundance of **Si-30** is **3.1%**