

3.091 Fall Term 2004

Homework Quiz #1A

Solution outline

- (a) The radioactive isotope, cobalt-60 (^{60}Co), is a gamma-ray source and is used in medical applications, e.g., treatment of certain forms of cancer. For the neutral atom of ^{60}Co specify the following:

number of protons, $n_p = 27$

number of electrons, $n_e = 27$

number of neutrons, $n_n = 33$

- (b) If there were only two isotopes of cobalt, ^{58}Co and ^{60}Co , what would be the natural abundance of each?

Use the value of the atomic mass of Co given in your periodic table to solve the problem. This should agree with the value computed by

$$58x + 60(1 - x) = 58.93320$$

Solving for x gives the value, $x = 0.533$.

Thus the natural abundance of each isotope would be

^{58}Co 53.3%

^{60}Co 46.7%