19/05/2022

B.Tech 1st year (Unit: Nuclear and particle physics)
H.W. Questions(Radioactivity)

1. How long does it take for 60.0 percent of a sample of radon to decay? (*Half life of Rn: 3.82days*) **(Ans: 5.05 d)**
2. A sample of ^{14}C whose halflife is 5730 years has a decay rate of 14 disintegrations per min per gm of natural Carbon. A fossil is found to have radioactivity of 4 disintegrations per min per gm of its present Carbon. How old is the fossil? **(Ans: 10,350 Years)**
3. Find the activity of 1.00 mg of radon, ^{222}Rn, whose atomic mass is 222 u. **(Ans:155 Ci)**
4. What will the activity of the above radon sample be exactly one week later?**(Ans:43 Ci)**
5. The atomic ratio between the uranium isotopes ^{238}U and ^{234}U in a mineral sample is found to be 1.8×10^4 . The half-life of ^{234}U is $T_{1/2}(234) = 2.5 \times 10^5$ y. Find the half-life of ^{238}U. **(Ans: 4.5×10^9 y)**
6. The polonium isotope $^{210}_{84}Po$ is unstable and emits a 5.30-MeV alpha particle. The atomic mass of $^{210}_{84}Po$ is 209.9829 u and that of $^{4}_{2}He$ is 4.0026 u. Identify the daughter nuclide and find its atomic mass.**(Ans: daughter nuclide is $^{206}_{82}Pb$; atomic mass:205.9745 u)**