USPAS 2019 Name:

The Effect of Radiation on Electronics and Materials

Homework 1

June 24, 2019

Due June 25, 2019 at 9am

1. A radioactive sample consists of $^{35}S$ and $^{32}P$. Initially 5% of the activity is due to $^{35}S$ and 95% to the $^{32}P$. At what subsequent time will the activities of the two radionuclides be equal?

2. What is the stopping power of a 7 MeV alpha particle in water?

3. What is the stopping power of 7 MeV electrons in silicon?

4. Calculate the stopping power of PMMA (acrylic for Lichtenberg figures) for a 6 MeV proton. ($n = 3.65x10^{23}\frac{electrons}{cm^3}, I = 74eV$)

5. What is the fraction of the energy of a 4 MeV electron that is converted into bremsstrahlung when the particle is absorbed in tungsten?

6. Name the 3 types of interactions between gamma rays and matter. Provide a brief explanation.

7. Make an estimate of the number of collisions that a neutron with an initial energy of 1 MeV makes with hydrogen in order to be reduced to 1 eV.