DAY 28

1. A typical chest X-ray results in an exposure of 10 milliREM. How many chest X-rays would be required to equal the occupational exposure of a hospital radiologist.

2. What is the LLE involved in receiving a chest X-ray?

3. A 50 kg woman receives a 5 milliREM dose of γ rays. How much energy (in J) did she absorb?

4. A 50 kg woman receives a 5 milliREM dose of α radiation. How much energy (in J) did she absorb?

5. Rework the Co-60 example problem, but assume the radioisotope in the box is Iodine-131 instead of Co-60.

6. A 600 REM exposure is almost always fatal. For a person who weighs 160 lb, how much absorbed energy is that? Compare this energy to the Kinetic Energy of a 500 ml bottle of water tossed to you at a speed of 5 m/s and discuss your answer.

7. In the Radon example, all the reactions that follow the decay of Radon-222 were written out. Write out all that precede Radon-222 in the Uranium-238 decay series.

8. Molybdenum-99 is unstable. Use the Periodic Table with Isotope Information to determine how it decays. If the daughter formed from the decay of Mo-99 is unstable, follow the decay series until a stable product is formed.

9. How many Joules of β radiation must a 130 lb woman absorb before she will start having significant blood damage?

10. **PHY 232 Only:**
In a decay series, parent nucleus A decays into daughter nucleus B, which decays into "granddaughter" nucleus C. A has half-life $T_{½A}$ and decay constant λ_A, B has half-life $T_{½B}$ and decay constant λ_A, and C is stable. We start with N_0 nuclei (all A). Obtain a formula for the time at which the number of B's reaches a maximum?

11. **PHY 232 Only:**
In the above problem, at what time is the number of B's at a maximum if $T_{½A}$= 10 years and $T_{½B}$= 2 years. What if these values are reversed?