Radioactive Decay – Supplemental Worksheet

**Problem #1:** A sample of phosphorus-32 has an initial activity of 58 counts per second. After 12.3 days, the activity was 32 counts per second. (1) What is the half-life of phosphorus-32? (2) If phosphorus-32 is used in an experiment to monitor the consumption of phosphorus by plants, what fraction of the nuclide will remain after 30 days?

**Problem #2:** Determine the percentage of a tritium sample that remains after 11.0 years knowing that the half-life of tritium is 12.3 years.

**Problem #3:** A 250.0 mg sample of carbon from a piece of cloth excavated from an ancient tomb in Nubia undergoes $1.50 \times 10^3$ carbon-14 disintegrations in 10.0 hours. If a current 1.00 g sample of carbon shows 921 carbon-14 disintegrations per hour, how old is the piece of cloth? The half-life of carbon-14 is $5.73 \times 10^3$ years.

**Problem #4:** A sample of carbon of mass 250.0 mg from wood found in a tomb in Israel underwent 2480 carbon-14 disintegrations in 20.0 hours. Estimate the time since death, knowing that a 1.00 g of carbon from a modern source underwent $1.84\times10^4$ disintegrations in 20.0 hours. The half-life of carbon-14 is $5.73 \times 10^3$ years.