

Names: _____

PHYS 7501, FS 2021

Group Activity 20

Due: In class, November 23rd

1. A household smoke detector's activity of $\sim 1\mu\text{Ci}$ from ^{241}Am corresponds to $\sim 0.2\mu\text{g}$ of material (See HW3 for a similar calculation involving a lantern mantle). According to the IAEA, ^{241}Am emits ~ 3.3 thermal neutrons per neutron-induced fission. The NNDC lists $\sigma_{n_{\text{therm},f}} \sim 3.2\text{b}$ and the density of ^{241}Am is $\sim 12\text{g/cm}^3$. Considering all of those facts, how many household smoke detectors would you need to amass to achieve criticality?