

HONORS CHEMISTRY  
WORKSHEET 13a.

Name: \_\_\_\_\_

**1. Write a balanced nuclear equation for each of the following:**

a. Alpha decay of  ${}_{95}^{241}\text{Am}$

b. Beta decay of  ${}_{27}^{60}\text{Co}$

c. Beta decay of  ${}_{30}^{90}\text{Sr}$

d. Positron production:  ${}_{7}^{13}\text{N} \rightarrow {}_{+1}^0\text{e} + ?$

**2.** The isotope  ${}_{11}^{24}\text{Na}$  has a half-life of 15 hours. If 30 micrograms ( $\mu\text{g}$ ) are injected into a patient, how much will remain in 60 hours?

**3.** The isotope  ${}_{38}^{90}\text{Sr}$  has a half-life of 29 years. Growing plants take up  ${}_{38}^{90}\text{Sr}$  from the soil via their roots, and the cows that eat the grass incorporate it into their bones in place of calcium and also secrete it into their milk, which humans frequently consume. If soil containing fallout from nuclear tests (conducted before international treaties banned above-ground nuclear tests) was tested in 1970 and had 510 times the radiation considered safe for human health, until what year will the soil radioactivity remain above safe levels?