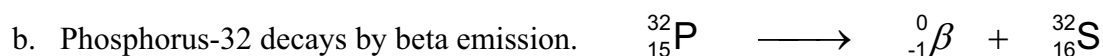
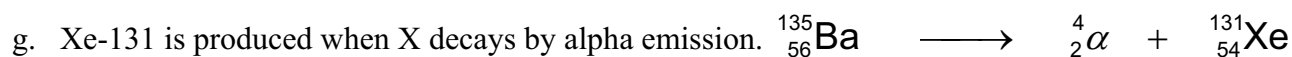
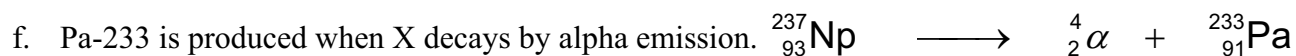
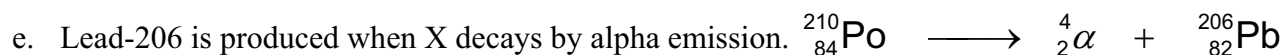
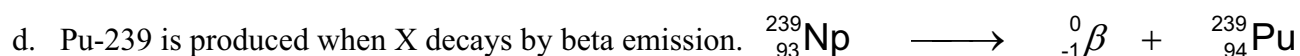
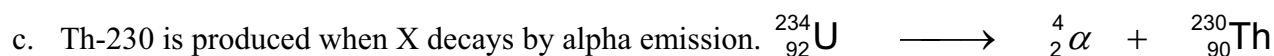
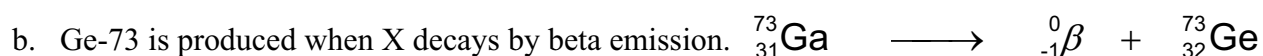
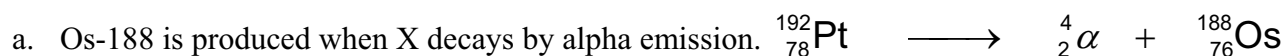


CHM 130: Chapter 18 Homework Problems Key

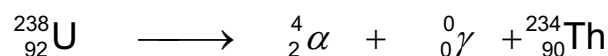
1. Write nuclear equations for each of the radioactive decay described below:



2. Determine the parent nuclide (X) that produced the daughter nuclide from each of the following nuclear reactions described:



h. Th-234 is produced when X decays by alpha emission and gamma emission.



3. Strontium-90 has a half-life of 28.8 years. What mass of a 75.0 mg sample of Sr-90 remains after 86.4 years?

$$\frac{\text{time elapsed}}{t_{1/2}} = \frac{86.4 \text{ years}}{28.8 \text{ years}} = 3 t_{1/2} \quad \frac{75.0 \text{ mg}}{2} = \frac{37.5 \text{ mg}}{2} = \frac{18.8 \text{ mg}}{2} = \mathbf{9.40 \text{ mg}}$$

4. Mo-99 has a half-life of 67 hours. What mass of an 86.0 mg sample of Mo-99 remains after 134 hours?

$$\frac{\text{time elapsed}}{t_{1/2}} = \frac{134 \text{ h}}{67 \text{ h}} = 2 t_{1/2} \quad \frac{86.0 \text{ mg}}{2} = \frac{43.0 \text{ mg}}{2} = \mathbf{21.5 \text{ mg}}$$

5. Lead-210 has a half-life of 20.4 years. What mass of a 50.0 mg sample of Pb-210 remains after 81.6 years?

$$\frac{\text{time elapsed}}{t_{1/2}} = \frac{81.6 \text{ years}}{20.4 \text{ years}} = 4 t_{1/2}$$
$$\frac{50.0 \text{ mg}}{2} = \frac{25.0 \text{ mg}}{2} = \frac{12.5 \text{ mg}}{2} = \frac{6.25 \text{ mg}}{2} = \mathbf{3.13 \text{ mg}}$$

6. Curium-242 has a half-life of 163 days. What mass of a 48.0 mg sample of Cm-242 remains after 489 days?

$$\frac{\text{time elapsed}}{t_{1/2}} = \frac{489 \text{ days}}{163 \text{ days}} = 3 t_{1/2} \quad \frac{48.0 \text{ mg}}{2} = \frac{24.0 \text{ mg}}{2} = \frac{12.0 \text{ mg}}{2} = \mathbf{6.00 \text{ mg}}$$

7. Cf-245 has a half-life of 44 minutes. What mass of a 96.0 mg sample of Cf-245 remains after 2 hours and 12 minutes?

$$\frac{2 \text{ h } 12 \text{ min.}}{44 \text{ min.}} = \frac{132 \text{ min.}}{44 \text{ min.}} = 3 t_{1/2} \quad \frac{96.0 \text{ mg}}{2} = \frac{48.0 \text{ mg}}{2} = \frac{24.0 \text{ mg}}{2} = \mathbf{12.0 \text{ mg}}$$

8. Lead-214 has a half-life of 27 minutes. What mass of a 64.0 mg sample of Pb-214 remains after an hour and 48 minutes?

$$\frac{1 \text{ h } 48 \text{ min.}}{27 \text{ min.}} = \frac{108 \text{ min.}}{27 \text{ min.}} = 4 t_{1/2}$$
$$\frac{64.0 \text{ mg}}{2} = \frac{32.0 \text{ mg}}{2} = \frac{16.0 \text{ mg}}{2} = \frac{8.00 \text{ mg}}{2} = \mathbf{4.00 \text{ mg}}$$