

## CHAPTER 17

### RADIOACTIVITY AND NUCLEAR CHEMISTRY

#### Practice Problems

1. (a) Write a nuclear equation for alpha decay of Po-210.



- (b) Write a nuclear equation for beta decay of Th-232.



- (c) Write a nuclear equation for positron emission by Co-58.



2. A 68-mg sample of a radioactive nuclide is administered to a patient to obtain an image of her thyroid. If the nuclide has a half-life of 12 hours, how much of the nuclide remains in the patient after 4.0 days?

$$4 \text{ days} \times \frac{24 \text{ hours}}{1 \text{ day}} = \frac{96 \text{ hours}}{12 \text{ hours}} = 8 \text{ half-lives}$$

$$68 \text{ mg} \times \left(\frac{1}{2}\right)^8 = 68 \text{ mg} \times \frac{1}{256} = 0.265625 \text{ mg} \approx 0.27 \text{ mg}$$

3. A mammoth skeleton has a carbon-14 content of 12.5% of that found in living organisms. When did the mammoth live?

The age of the mammoth is equal to three half-lives of  $\text{C-14}$ , which approximately

$$\frac{11,460 \text{ yrs}}{3} = 3,820 \text{ yrs old.}$$