Handout 5

Half-Life Practice Problems

To find half-lives that have passes...	*To find remaining amount...*
	If you have the # of $t_{1/2}$... If you DON'T have the # of $t_{1/2}$...
To find one half-life	*Total time passed*

Symbols used

i= initial amount

r= remaining amount

$t_{1/2}$= time of one half life

p=time passed n= # of half lives passed

Solve for the problems. Be sure to identify each piece of information.

1. The half-life of cesium-137 is 30.2 years. If the initial mass of a sample of cesium-137 is 1.00 kg, how much will remain after 151 years?

   $t_{1/2}$ =

   i=

   p=

   n=

2. Give that the half-life of carbon-14 is 5730 years, consider a sample of fossilized wood that, when alive, would have contained 24 g of carbon-14. It now contains 1.5 g of carbon-14. How old is the sample?

   $t_{1/2}$ =

   i=

   r=

   n=

3. A 64-g sample of germanium-66 is left undisturbed for 12.5 hours. At the end of that period, only 2.0 g remain. What is the half-life of this material?

   $t_{1/2}$ =

   i=

   p=

   n=

4. With a half-life of 28.8 years, how long will it take for 1 g of strontium-90 to decay 125 mg?

5. Cobalt-60 has a half-life of 5.3 years. If a pellet that has been in storage for 26.5 years contains 14.5 g of cobalt-60, how much of this radioisotope was present when the pellet was put into storage?

6. A 1.000-kg block of phosphorus-32, which has a half-life of 14.3 days, is stored for 100.1 days. At the end of this period, how much phosphorus-32 remains?

7. A sample of air from a basement is collected to test for the presence of radon-222, which has a half-life of 3.8 days. However, delays prevent the sample from being tested until 7.6 days have passed. Measurements indicate the presence of 6.5 μg of radon-222. How much radon-222 was present in the sample when it was initially collected?

8. The half-life of sodium-25 is 1.0 minute. Starting with 1 kg of this isotope, how much will remain after half an hour?

9. What is the half-life of polonium-214 if, after 820 seconds, a 1.0-g sample decays to 31.25 mg?