Radioactivity

1. Who discovered radioactivity? Approximately when was it discovered?

2. What is radioactive decay?

3. Describe what happens to radioisotopes (parent isotopes) during nuclear (radioactive) decay.

4. What particles make up an alpha particle?

5. How is the daughter element different from the parent isotope in alpha decay?

6. How is a beta particle created, and what is the actual beta particle?

7. How is the daughter element different from the parent isotope in beta decay?

8. What is gamma radiation?

9. Which is the most penetrating (cannot be easily stopped) of the radiation types, and why?

10. What is a half-life?

11. Can the half-life of a given isotope be altered by heat, pressure or some other physical means? Explain.

12. What is transmutation?

13. Describe a transuranium element, and its characteristics.

14. Why do we use Carbon-14 to date things that were living rather than Uranium-238?

How to Solve These Half-Life Problems

(starting amount) x $(1/2)^{\text{number of half-lives}}$ = amount remaining
or
(starting amount) x $(0.5)^{\text{number of half-lives}}$ = amount remaining

number of half-lives =(total time elapsed ÷ length of half-life)

This table is very useful to solve simple half-live problems.

half-life	0	1	2	3	4	5	6
fraction remaining	1	1/2	1/4	1/8	1/16	1/32	1/64
Decimal Remaining	1	0.50	0.25	0.125	0.0625	0.0313	.0156

fraction remaining = $(1/2)^{t/T}$

t = total time elapsed
T = half-life
number of half-lives = t/T

1. The half-life of Zn-71 is 2.4 minutes. If one had 100.0 g at the beginning, how many grams would be left after 7.2 minutes has elapsed?

2. Pd-100 has a half-life of 3.6 days. If one had 6.02 x 1023 atoms at the start, how many atoms would be present after 20.0 days?

3. After 24.0 days, 2.00 milligrams of an original 128.0 milligram sample remain. What is the half-life of the sample?

4. Rn-222 has a half-life of 3.82 days. How long before only 1/16 of the original sample remains?