

Half-life WS

$$\log \frac{N_0}{N_t} = \frac{0.301 t}{t_{1/2}}$$

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

SO all these problems have ones like them worked out on Jing videos and then uploaded to SchoolTube since I hear a few people are having problems accessing the Jing web site. The links are imbedded in each problem, or if you like, here they all are as well (HL = half-life)

[HL 1](#) [HL 2](#) [HL 3](#) [HL 4](#) [HL 5](#) [HL 6](#) [HL 7](#) [HL 8](#) [HL 9](#) [HL 10](#)

For problems 1-5 below, do not use the above equation: just think it out based on the fact that the sample is being cut in half every half-life. Then for 6-10, approximate your answer first, then set up & solve using the log equation above.

1. [How long would it take for a 80.0 mCi sample of H-3 to decay down to just...](#)

- a) 40.0 mCi? \_\_\_\_\_ b) 20.0 mCi? \_\_\_\_\_ c) 1.25 mCi? \_\_\_\_\_

Half lives of some radioisotopes:

H-3	12.3 y
C-14	5730 y
Ba-137m	2.6 m
U-238	4.5 billion y
Co-60	5.26 y
Po-215	1.8 ms
Na-24	15 h
I-131	8.0 d

2. [Of a 32.0 mCi sample of I-131, how much will remain after...](#)

- a) 16 days? \_\_\_\_\_ b) 40.0 days? \_\_\_\_\_ c) 80.0 days? \_\_\_\_\_

3. a) [What percent of a Co-60 sample will remain after 10.52 years?](#) \_\_\_\_\_

Ans: (IAO +1): 0.03125 0.443 0.700 1.0 1.36  
1.5 2.88 3.38 4.43 5.6 8.0 8.1  
9.34 12.3 14.2 21 22.1 24.6 25  
31.7 52.5 73.8 81.1 87.5 89.6

b) What percent of a Na-24 sample will decay in 45 hours? \_\_\_\_\_

Units: (IAO +1) min min hr hr day day yr yr  
% % % % mCi mCi mCi mCi mCi  
mCi mCi mCi mCi mCi

4. [Currently a Ba-137m sample has a radioactivity level of 0.350 mCi. What was its radioactivity level...](#)

- a) 2.6 min ago? \_\_\_\_\_ b) 10.4 min ago? \_\_\_\_\_ c) 20.8 min ago? \_\_\_\_\_

5. a) [A sample of Ga-74 decays from 24.0 mCi down to 1.5 mCi in a period of 32.4 min. What is Ga-74's half-life?](#) \_\_\_\_\_

b) A sample of Mg-28 decays down to just 25% of its original level in 42 hours. What is Mg-28's half-life? \_\_\_\_\_

c) It takes 7.5 days for 96.875% of a sample of Kr-79 to decay. What is Kr-79's half-life? \_\_\_\_\_

For the remaining problems, first approximate the answer using the same technique used above, then set up and solve using the log equation. Remember to show your work.

6. How long would it take for a 80.0 mCi sample of H-3 to decay down to a) 23.0 mCi? \_\_\_\_\_ b) 68.0 mCi? \_\_\_\_\_

$\frac{N_0}{N_t}$	$\frac{0.301 t}{t_{1/2}}$
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Est: \_\_\_\_\_ Est: \_\_\_\_\_

7. Of a 32.0 mCi sample of I-131, how much will remain after a) 9.4 days? \_\_\_\_\_ b) 22.8 days? \_\_\_\_\_

Est: \_\_\_\_\_ Est: \_\_\_\_\_

8. a) What percent of a Co-60 sample will remain after 4.89 years? \_\_\_\_\_

Est: \_\_\_\_\_

b) What percent of a Na-24 sample will decay in 36 hours? \_\_\_\_\_

Est: \_\_\_\_\_

9. A Ba-137m sample has a level of 0.350 mCi. What was its level...a) 5.1 min ago? \_\_\_\_\_ b) 53 sec ago? \_\_\_\_\_

Est: \_\_\_\_\_ Est: \_\_\_\_\_

10. a) A sample of Pb-201 decays from 24.0 mCi down to 10.0 mCi in a period of 11.8 h. Pb-201 half-life = \_\_\_\_\_

Est: \_\_\_\_\_

b) It takes 7.50 min for 78.5% of a sample of Ne-24 to decay. What is Ne-24's half-life? \_\_\_\_\_

Est: \_\_\_\_\_