## **Half-Life Calculations**

Name:						

1. If 100.0g of carbon-14 decays until only 25.0g of carbon-14 is left after 11,460 years, what is the half-life of carbon-14?

Starting amount 1009 ending amount 259 Total time 11460 yrs Half life?

2. What is the half-life of a 100.0g sample of nitrogen-16 that decays to 12.5g of nitrogen-16 in 21.6 seconds?

Starling amount 100g ending amount 12,5g Total Time 21.65 Half life?

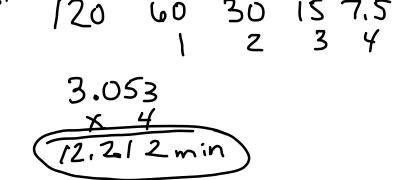
$$\frac{100}{1} = \frac{50}{2} = \frac{12.5}{3}$$

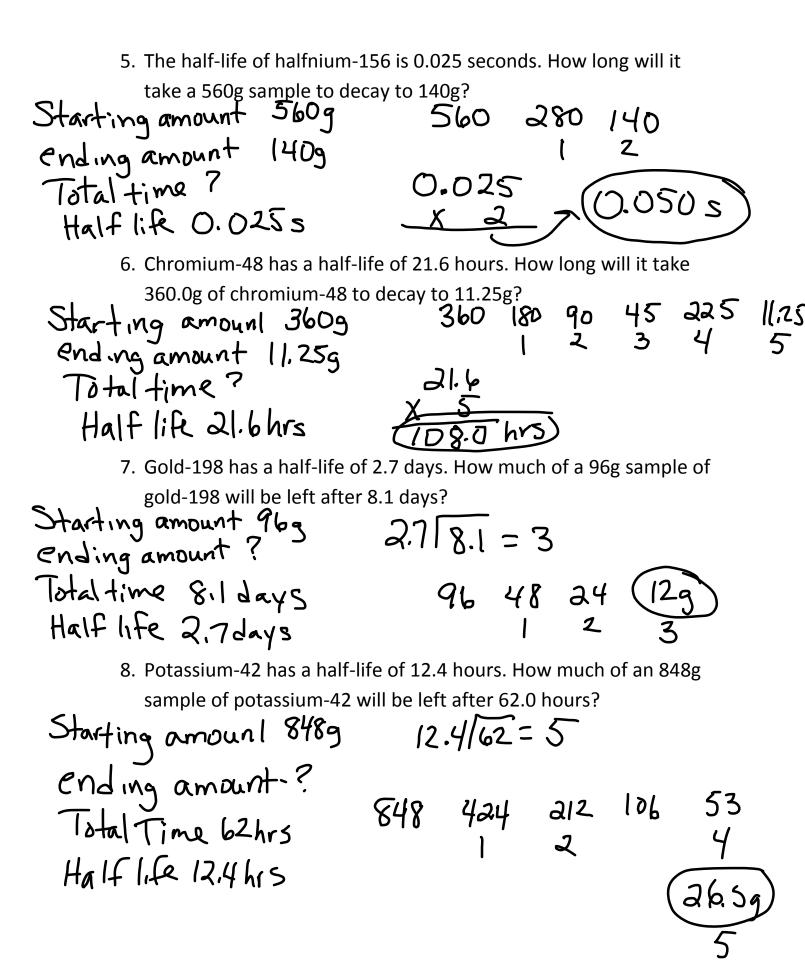
3. A 208g sample of sodium-24 decays to 13.0g of sodium-24 within 60.0hrs. What is the half-life of this radioactive isotope?

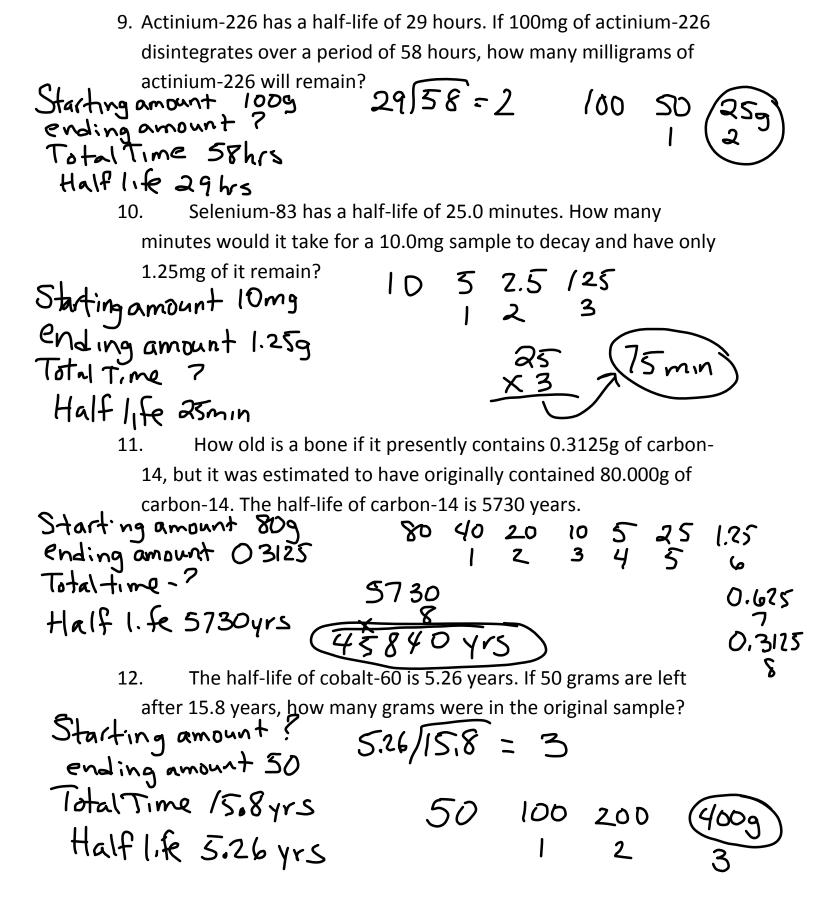
Starting amount -208g ending amount-13g Total time 60 hr Half life 7

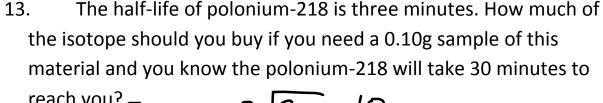
4. Thallium-208 has a half-life of 3.053 minutes. How long will it take

for 120.0g to decay to 7.5g?
Starling amount 120g
ending amount 7.5g
Total time?
Halflife 3.053 min









Stacting amount?

Ending amount 0.10g

Total Time 30min

halflife 3min

$$3\sqrt{30} = 10$$
 $0.10 \quad 0.20 \quad 0.40 \quad 0.80$ 
 $1 \quad 2 \quad 3$ 
 $0.4 \quad 12.8 \quad 35.6 \quad 51.2$ 
 $6 \quad 7 \quad 8 \quad 9$ 

itium is 12 3 years. If 48 0mg of tritium is

14. The half-life of tritium is 12.3 years. If 48.0mg of tritium is released from a nuclear power plant during the course of a mishap, what mass of the tritium will remain after 49.2 years?

Starting amount 48mg ending amount? Total time 49,24rs Halflife 12,34vs

15. Iron-59 is used in medicine to diagnose blood circulation disorders. The half-life of iron-59 is 44.5 days. How much of a 2000mg sample will remain after 133.5 days?

Starling amount 2000mg ending amount? Total time 133,5 days Half life 44.5 days

02.4

16. A doctor suspects that his patient may have Grave's Disease, a thyroid disorder. To be sure he asks the technician to perform radionuclide scanning. This procedure requires the use of iodine-131 which, when given in small doses, is used as a medical tracer to detect thyroid disorders. A patient swallows 10 grams of the iodine-131. Sixteen days later, the detectors observe 2.5 grams of iodine in the patient's thyroid. What is the half-life of iodine-131?

Starting amount 10g ending amount 2.5g Total Time 16 days Half life - ?

17. To prevent food spoilage, food can be irradiated with gamma rays from cobalt-60. If the half-life of cobalt-60 is 5.3 years, how much of a 75g sample will remain after 1.3 years?

Starting amount? Ending amount? Total Time 1.3yrs Half life 5.3yrs

$$5.3 \overline{\smash{\big)}\ 3} = 0.25$$

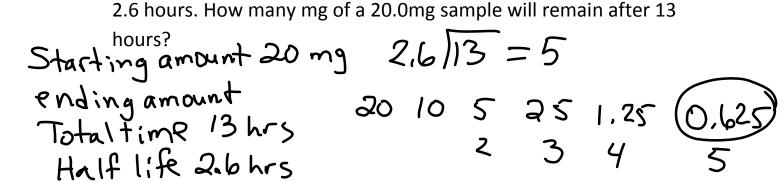
$$75 \quad 37.5 \quad 37.5 \cdot 0.25 = 9.375$$

$$1 \quad 75 - 9375 \cdot 65.625$$

18. Scientists use carbon-14 dating to determine the age of archeological artifacts up to 50,000 years old. Carbon-14 has a half-life of 5730 years. A 10,000 year old fossil currently contains 1.8g of carbon-14. How many grams of carbon-14 did the fossil originally contain?

5730 10000 - 1.75

Starting amount? ending amount 1.8g Total time 10000 Half life 5730



Manganese-56 decays by beta emission and has a half-life of

19.

20. Uranium-238 has a half-life of 4.46 billion years. How long will it take for a 12g sample to decay to 0.1875g?

Starting amount 129
12 6 3 15 0.75
Chding amount 0,1875
Total Time?
0,375
Half I fe 4.46 billion Krs

4.46 26.76 billion years