

Half-life Practice Worksheet

1. A scientist has 100 grams of an isotope has a half-life of 36 hours. How much time will have elapsed when he has 5 grams of the isotope left?
2. Fermium-253 has a half-life of 0.334 seconds. After 10 half-lives, the fermium-223 is completely decayed. How much time will elapse for this to happen?
3. The half-life of radon-222 is 3.823 days. What was the original mass of a sample of radon-222 if 0.05 grams remained after 1 week?
4. The half-life of Zinc-71 is 2.4 minutes. If there were 100 grams of Zinc-71 at the beginning, how much would be left after 7.2 minutes?
5. Potassium-42 has a half-life of 12.4 hours. How much potassium-42, weighing 848 grams, is left after 62 hours?

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Answers

1. A scientist has 100 grams of an isotope has a half-life of 36 hours. How much time will have elapsed when he has 5 grams of the isotope left?

155.6 hours

The half-life of the isotope is 36 hours. So for the isotope to decay to 5 grams, the time that would have to pass would be

$$5.00 / 100.0 = (1/2)^n$$

$$n = 4.32 \text{ half-lives}$$

$$36 \text{ hours} \times 4.32 = 155.6 \text{ hours}$$

2. Fermium-253 has a half-life of 0.334 seconds. After 10 half-lives, the fermium-223 is completely decayed. How much time will elapse for this to happen?

3.34 seconds

The time taken for fermium-253 to completely decay = 0.334×10 seconds
= 3.34 seconds

3. The half-life of radon-222 is 3.823 days. What was the original mass of a sample of radon-222 if 0.05 grams remained after 1 week?

0.178 grams

After 1 week, radon-222 goes through 1.831 half-lives ($7/3.823 = 1.831$). The original mass of the sample = $0.05 / (1/2)^{1.831} = 0.178$ grams

4. The half-life of Zinc-71 is 2.4 minutes. If there were 100 grams of Zinc-71 at the beginning, how much would be left after 7.2 minutes?

12.5 grams

After 7.2 minutes, Zinc-71 passes through 3 half-lives ($7.2/2.4 = 3$). So after 3 half-lives, the amount of Zinc-71 left is $1/2^3 \times 100 = 12.5$ grams.

5. Potassium-42 has a half-life of 12.4 hours. How much potassium-42, weighing 848 grams, is left after 62 hours?

26.5 grams

After 62 hours, the sample of potassium-42 passes through 5 half-lives ($62/12.4 = 5$). So after 5 half-lives, the amount of potassium-42 left is $= 1/2^5 \times 848$ grams = 26.5 grams