

# Radioactive Half-life Worksheet with Answers

1. What is the meaning of the term 'half-life' with regard to radioactivity?
2. Why is it necessary to know the half-life of radioactive materials?
3. What is the half-life of a radioactive sample if it decays from a 100 grams to 12.5 grams in 27.9 hours?
4. How many half-lives have passed if you started with 200 grams of a radioactive substance and now have 25 grams?
5. If we start with 480 grams of a substance, how much is left after 3 half-lives?
6. What is the half-life of a radioactive isotope that decays from 600 grams to 75 grams in 6.9 days?

# Radioactive Half-life Worksheet with Answers

## Answers

1. What is the meaning of the term 'half-life' with regard to radioactivity?

Half-life refers to the time required for half of the atoms in a radioactive sample to become more stable.

2. Why is it necessary to know the half-life of radioactive materials?

There are several reasons where knowing the half-life of a radioactive substance will be useful. These include situations like:

- Knowing the half-life of a radioactive isotope gives us an idea of how long its radiation would last. This is helpful to doctors looking to use radioactive tracers in cancer treatments.
- Knowing the half-life of a radioactive isotope also helps with regards to storage, as knowing how long the substance will remain radioactive will determine the type of containment required.

3. What is the half-life of a radioactive sample if it decays from a 100 grams to 12.5 grams in 27.9 hours?

9.3 hours

For a sample to decay from 100 grams to 12.5 grams, it must pass through 3 half-lives (100 → 50 → 25 → 12.5). So, the half-life of the substance is =  $27.9/3 = 9.3$  hours.

4. How many half-lives have passed if you started with 200 grams of a radioactive substance and now have 25 grams?

3 half-lives

$200 \times \frac{1}{2} = 100 \rightarrow 100 \times \frac{1}{2} = 50 \rightarrow 50 \times \frac{1}{2} = 25$

5. If we start with 480 grams of a substance, how much is left after 3 half-lives?

60 grams

$480 \times \frac{1}{2} = 240 \rightarrow 240 \times \frac{1}{2} = 120 \rightarrow 120 \times \frac{1}{2} = 60$

6. What is the half-life of a radioactive isotope that decays from 600 grams to 75 grams in 6.9 days?

2.3 days

For a sample to decay from 600 grams to 75 grams, it has to pass through 3 half-lives ( $600 \times \frac{1}{2} \rightarrow 300 \times \frac{1}{2} \rightarrow 150 \times \frac{1}{2} \rightarrow 75$ ). So, the half-life of the isotope is  $6.9/3 = 2.3$  days.