Saitechinfo Worksheet

Explanation of Problems

Problem
Given:

- The archaeological remains of a wooden artifact contain 2% of the original ^{14}C activity.
- Half-life ($t_{1/2}$) of ^{14}C is 5760 years.

Find the age of the wood using the decay formula:
$N = N_0 \left(\frac{1}{2}\right)^{\frac{t}{t_{1/2}}}$
Where:

- N is the current amount of ^{14}C.
- N_0 is the original amount of ^{14}C.
- t is the time elapsed.
- $t_{1/2}$ is the half-life of the isotope.

Here, $\frac{N}{N_0} = 0.02$.
Problem
Given:

- The amount of ^{14}C in a piece of wood is 1/5 of that in a fresh piece of wood.
- Half-life ($t_{1/2}$) of ^{14}C is 5577 years.

Find the age of the wood using the decay formula:
$\frac{N}{N_0} = \frac{1}{5}$
Problem
Given:

- Half-life period of radon is 3.8 days.
- Find the number of days after which only 1/20 of the radon sample will be left over.

Use the decay formula:
$\frac{N}{N_0} = \frac{1}{20}$
Problem
Given:

- Half-life period of ^{131}I is 13.3 hours.
- Find the fraction of ^{131}I remaining after 79.8 hours.

Use the decay formula:
$\frac{N}{N_0}$

Problem
Given:

- The $^{14}C/^{12}C$ ratio in a piece of wood is 0.6 times that in a living plant.
- Half-life ($t_{1/2}$) of ^{14}C is 5760 years.

Find the period when the plant died using the decay formula:
$\frac{N}{N_0} = 0.6$

Worksheet

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1. The half-life of a radioactive isotope is 10 years. If a sample originally has 80 grams and now contains 5 grams, how old is the sample?
2. A sample of ^{14}C has decayed to 25% of its original amount. If the half-life of ^{14}C is 5760 years, how many years have passed?
3. A sample of ^{226}Ra decays to 1/8th of its original amount in 4800 years. What is the half-life of ^{226}Ra?
4. A fossil contains 12.5% of the original amount of ^{14}C. Given the half-life of ^{14}C is 5730 years, calculate the age of the fossil.
5. A certain radioactive isotope has a half-life of 5 hours. If you start with 200 grams, how much will be left after 20 hours?
6. After 3 half-lives, what fraction of the original radioactive substance remains?
7. A 100-gram sample of a radioactive substance is observed for 3 half-lives. What mass of the substance remains?
8. If a radioactive isotope has a half-life of 1000 years and you start with 400 grams, how much remains after 3000 years?
9. A sample of ^{32}P has decayed to 1/16th of its original amount in 56 days. What is the half-life of ^{32}P?
10. The half-life of ^{60}Co is 5.27 years. How long will it take for a sample to decay to 10% of its original activity?

Answer Key

1. 30 years
2. 11520 years
3. 1600 years
4. 17190 years
5. 12.5 grams
6. 1/8
7. 12.5 grams
8. 50 grams
9. 14 days
10. 17.55 years