Name: ..... Class: .....

Half-life - word problems

$$\text{New quantity} = \text{initial quantity} \times \frac{1}{2}^{\left(\frac{t}{t_{\frac{1}{2}}}\right)}$$

t = time.

$t_{\frac{1}{2}}$ = half life.

1. The half-life of a radioactive potassium-40 found in bananas is **1 year**. How much will be left after **2 years** if you start with **100** grams of it ?

2. How much of a radioactive kind of carbon will be left after **60 minutes** if you start with **800 grams** and the half-life is **30 minutes** ?

3. The half-life of a radioactive natural radium found in brazil nuts is **24 hours.** If you start with **400 grams** of it, how much will be left after **72 hours ?**

4. How much of a radioactive kind of Nitrogen will be left after 50 minutes if the half-life is 25 minutes and you have 500 grams initially?

5. The half-life of a radioactive americium-241 found in smoke detectors is 25 days. How much will be left after 100 days if you begin with 80 grams?

6. The half-life of a radioactive technetium-99m found in medical isotopes used for imaging is 6 hours. How much will be left after 12 hours if you begin with 30 grams?

7. The half-life of uranium-238 present in the Earth's crust has a half-life of almost 4.5 billion years. What amount of the unranium-238 will be left after 12.5 billion years if you begin with 250 grams?
Give your answer to the nearest hundredth

Solution

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Half-life - word problems

New quantity = initial quantity $\times \frac{1}{2}^{\left(\frac{t}{t_{\frac{1}{2}}}\right)}$

t = time.

$t_{\frac{1}{2}}$ = half life.

1. The half-life of a radioactive potassium-40 found in bananas is **1 year**. How much will be left after **2 years** if you start with **100** grams of it ?

- t = 2 years
- $t_{\frac{1}{2}}$ = 1 year
- initial quantity = 100 g

$$\text{New quantity} = 100 \times \left(\frac{1}{2}\right)^{\frac{2 \text{ years}}{1 \text{ year}}}$$

$$= 100 \times \left(\frac{1}{2}\right)^{2}$$

$$= 100 \times 0.25$$

$$= 25$$

25 grams will be left after 2 years.

2. 200 grams will be left after 60 minutes.

3. 50 grams will be left after 72 hours.

4. 125 grams of a radioactive kind of Nitrogen will be left.

5. 5 grams of americium -241 will be left after 100 days.

6. 7.5 grams of technetium-99m will be left after 12 hours.

7. 35.90 grams of uranium-238 will be left after 12.5 billion years.