

Situational tasks on a topic with answers

1. Find the activity of the investigational drug taken in the amount of 0.02 mCi after 23 days, if the half-life is $T = 46$ days.
Answer: $A = 1.4 \cdot 10^{-5}$ Ci.
2. Find the activity of a preparation if 10,000 nuclei of this substance disintegrate within 10 minutes.
Answer: $A = 16.7$ Bq.
3. Calculate the number of nuclei N , decayed during the first day, if the initial number of nuclei is equal to $N_0 = 10^{22}$.
Answer: $N - N_0 = 0.75 \times 10^{22}$.
4. A body weighing 60 kg during 6 hours absorbed 1 J of energy. Find the absorbed dose and absorbed dose rate in SI units and in non-SI units.
Answer: $D = 0.017$ Gy, $D = 1.7$ rad; $P = 2.8 \times 10^{-3}$ Gy / h, $P = 0.28$ rad / h.
5. The absorbed dose from gamma radiation was 10 rad, and from alpha radiation - 20 rad. Find the total equivalent dose if $K_g = 1$; $K_a = 20$.
Answer: $H = 410$ rem.
6. A point source of ^{60}Co is transported within 48 hours. Source activity $A = 5.4$ mCi. Determine the exposure dose that the forwarder can receive if he is at a distance of 2 m from the source ($K_g = 1.29$).
Answer: $X = 0.08$ R.
7. The maximum permissible absorbed dose received under the action of γ -radiation is $D_g = 5 \times 10^{-2}$ J / kg. Find the absorbed energy of gamma photons if the mass of a person is 65 kg.
Answer: 3.25 J.
8. The maximum permissible dose for occupational exposure is 100 mrem / wk. Recalculate this value for a year. What dose are we talking about?
Answer: $H = 5$ mrem / year. Equivalent dose.
9. Find the equivalent dose (H) received from X-rays if the exposure dose X is 5 R ($f = 0.9$).
Answer: 4.5 rem.
10. Find the exposure dose X if the absorbed dose D is 30 rad ($f = 0.8$).
Answer: 37.5 R.
11. The maximum permissible absorbed dose received under the action of g-radiation is $H_g = 5 \times 10^{-2}$ J / kg. Find the absorbed energy of gamma photons if the mass of a person is 70 kg.
Answer: 3.5 J.
12. Find the activity of the investigational drug taken in an amount of 0.01 mCi after 24 days if the half-life is $T = 48$ days.
Answer: 0.007 mCi.
13. Calculate the half-life if the decay constant is $\lambda = 0.0348$ yr $^{-1}$.
Answer: ≈ 20 years.