

Worksheet

(Chapter 3 Radioactivity)

MCQ (Multiple Choice Questions)

- Q1. The activity of a radioactive sample is decreased to 25% of the initial value after 30 days. The half-life (in days) of the sample is approximately
[You may use $\ln 4 \approx 1.4$]
(a) 14 (b) 28 (c) 42 (d) 70
- Q2. A sample of radioactive material A , that has an activity of 10 mCi ($1\text{ Ci} = 3.7 \times 10^{10}$ decays/s) has twice the number of nuclei as another sample of a different radioactive material B , which has an activity of 20 mCi . The correct choices for half-lives of A and B would then be respectively
(a) 20 days and 5 days (b) 10 days and 40 days
(c) 20 days and 10 days (d) 5 days and 10 days
- Q3. Using a nuclear counter the count rate of emitted particles from a radioactive source is measured. At $t = 0$ it was 1600 counts per second and at $t = 8$ seconds it was 100 counts per second. The count rate observed, as counts per second, at $t = 6$ seconds is close to
(a) 200 (b) 360 (c) 150 (d) 400
- Q4. Two radioactive materials A and B have decay constants 10λ and λ , respectively. If initially, they have the same number of nuclei, then the ratio of the number of nuclei of A to that of B will be $1/e$ after a time
(a) $\frac{1}{9}\lambda$ (b) $\frac{11}{10}\lambda$ (c) $\frac{1}{10}\lambda$ (d) $\frac{1}{11}\lambda$
- Q5. Half-lives of two radioactive nuclei A and B are 10 minutes and 20 minutes, respectively. If, initially a sample has an equal number of nuclei, then after 60 minutes, the ratio of decayed numbers of nuclei A and B will be
(a) 3: 8 (b) 1: 8 (c) 9: 8 (d) 8: 1
- Q6. Two radioactive substances A and B have decay constant 5λ and λ respectively. At $t = 0$, a sample has the same number of the two nuclei. The time taken for the ratio of the number of nuclei to become $(1/e)^2$ will be
(a) $2/\lambda$ (b) $1/\lambda$ (c) $1/4\lambda$ (d) $1/2\lambda$
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- Q7. The half-life period of a radioactive element X is the same as the mean lifetime of another radioactive element Y . Initially, they have the same number of atoms. Then
- (a) X and Y decay at the same rate always
 - (b) X will decay faster than Y
 - (c) Y will decay faster than X
 - (d) X and Y have the same decay rate initially

NAT (Numerical Answer Type)

- Q8. A particular radioisotope has a half-life of 3 days. In 15 days the probability of decay in percentage will be_____
- Q9. The half life of U_{92}^{238} undergoing α decay is 4.5×10^9 years and the activity of 1g sample of U_{92}^{238} is $A \times 10^4 \text{ decay sec}^{-1}$. Then what will be value of A?
- Q10. The half life of R^{222} undergoing α decay is 3.8 days years and the activity of 1mg sample of R^{222} is $A \times 10^{12} \text{ decay sec}^{-1}$. Then what will be value of A?
- Q11. If the half life of shroud of Turin is 5730y. If 92% of that in living tissue is still there then the half life time of shroud of Turin is given by _____.