

Question 1: Complete the table below regarding the four types of radiation.

	Mass	Charge
alpha particle	4	+2
beta particle	0	-1
positron	0	+1
gamma rays	0	0

Question 2: Which objects may be used to block radiation from alpha particles, beta particles, and gamma particles?

alpha particles: paper, regular clothing

beta particles: heavy clothing, lab coat

gamma rays: lead shield, concrete wall

Question 3: List three ways to reduce exposure to radiation.

Limit the amount of time spent near radioactive source.

Increase the distance from the source.

Use proper PPE (personal protective equipment).

Question 4: Technetium-99 is the most commonly used radioisotope used in medicine with approximately 40 million procedures performed worldwide each year. It has a half life of 6.00 hours. If a patient is given 2.08 grams of Tc-99, how many grams of the sample is remaining after 24 hours?

24 hours x (1 half life / 6.00 hours) = 4 half-lives

2.08 grams → 1.04 grams → 0.520 grams → 0.260 grams → 0.130 grams

Question 5: Strontium-89 is a radioisotope used to treat cancer-induced bone pain. It has a half life of 50.5 days. If a patient receives a dose of 426 mg, how many mg of the sample remains after 151.5 days?

$151.5 \text{ days} \times (1 \text{ half life} / 50.5 \text{ days}) = 3 \text{ half-lives}$

426 mg $\rightarrow$ 213 mg $\rightarrow$ 106.5 mg $\rightarrow$ 53.3 mg

Question 6: Why do radioisotopes used in medicine have relatively short half-lives?

Radiation emitted may affect tissues in other areas of the body than intended so it is best to limit the exposure to the radioactivity. Radioisotopes with shorter half lives will decay quicker in the body.

Question 7: List three types of medical imaging techniques that use radiation.

Positron Emission Tomography (PET) scans

X-ray scans

Computerized Tomography (CT) scans