843.

Problem 54.56 (RHK)

A 75-kg *person receives a whole-body radiation dose of* 24 mrad, *delivered by* α *particles for which the quality factor is* 12. *We have to calculate* (a) *the absorbed energy in joules and* (b) *the equivalent dose in rem*.

Solution:

(a)

A 75-kg person receives a whole-body radiation dose of 24 mrad, delivered by α particles for which the quality factor is 12.

An object is said to have received an absorbed dose of 1 rad when 10^{-5} J g^{-1} have been delivered to it by ionizing radiation.

Therefore, the energy absorbed by a 75-kg person who receives a whole-body radiation dose of 24 mrad will be $= 24\times10^{-3}\times10^{-5}\times75\times10^{3}$ J $= 18.0\times10^{-3}$ J $= 18$ mJ.

(b)

The dose equivalent in rem is found by multiplying the absorbed dose in rad by the quality factor, QF. As the person is exposed to radiation of dose of 24 mrad of $QF = 12$, the dose equivalent is 288 mrem.