9

Radioactive waste is stored in lead containers until the radioactivity decays to a safe level.

The rate of decay of this particular isotope is proportional to the amount of radiation the isotope already has.

At t = 200 days, the radiation was checked and found to be 120 curies.

At t = 320 days, the radiation was checked again and found to be 80 curies.

The radioactive waste will be relatively safe when the radiation has reached 30 curies or less.

Find how long this will take.

***dR = kR***

***dt***

***ln(R) = kt + c***

***sub t = 200, R = 120 : ln(120) = 200k + c equ1***

***sub t = 320, R = 80 : ln(80) = 320k + c equ2***

***subtracting : ln(80) – ln(120) = 120k***

***so k = -0.003379***

***sub in equ 2 c = 5.463***

***sub in the equ: ln(R) = kt + c***

***ln(R) = -0.003379t + 5.463***

***if R = 30 : ln(30) = -0.003379t + 5.463***

***so t ≈ 610days***

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