

AUTHORIZED REFERENCE: Calculator, Physics Reference Card

Wt. No.

- 20** 1. A sample of ^{90}Sr undergoes beta decay according to the reaction:



Given the masses:

Sr: 89.907738 u

Y: 89.907152 u

β^- : 5.49E-4 u

- a) Calculate the disintegration energy, Q, for this reaction.

$Q = 0.0345 \text{ MeV}$ _{ans}

- b) ^{90}Sr has a half life of 29.1 years. Calculate the time it will take for the activity of this sample to be reduced to one third of its initial value.

$t = 46.1 \text{ years}$ _{ans}

- 05** 2. Describe the difference between a fission bomb and a “dirty” bomb

A fission bomb uses the energy produced through a fission chain reaction to cause mass destruction

A dirty bomb spreads radioactive material through the use of conventional (chemical) explosives.

- 05** 3. Can a reactor (as in a nuclear power plant) detonate like a fission bomb? Briefly explain your answer.

No. The low enrichment of fissionable material would not produce a sustained chain reaction in the short time period needed even if all of the extra material in a reactor was somehow instantaneously removed.