```
(*A sample of 1 g of a radioactive isotope of atomic mass 208 decays via β emission,
and 75 counts are recorded in a 24 hour period.If the detector efficiency is 10%,
estimate the mean life of the isotope.*)
ClearAll["Global`*"]
totalMass = Quantity[1., "Grams"];
atomicMass = Quantity[208., "AtomicMassUnit"];
nbrAtoms = totalMass / atomicMass;

nbrCounts = 75 / 0.10;
timeInterval = Quantity[24., "Hours"];
decayRate = nbrCounts / timeInterval;
meanLifetime = Solve[D[nbrAtoms Exp[-t / tau], t] == -decayRate Exp[-t / tau], tau][[1, 1]];

UnitConvert[tau /. meanLifetime, "Years"]
```

Out[ ]= 1.05763×10^{16} yr