Q- The percentage of the different isotopes in natural potassium are 93.00% K39, 0.012% K40 and 6.88% K41. K40 is radioactive and decays by B-decay with a half-life of $1.29*10^9$ years. Calculate the activity of 1 gram of natural potassium.

Mass of K40 in one gram of the natural potassium = 0.012/100 gram = $1.20*10^{-4}$ gm.

No. of 40K atoms present in this sample

$N = \frac{1.20*10^{-4}}{40} * 6.022 * 10^{23}$

$= 1.807*10^{18}$

Therefore

Activity of the sample is given by

dN/dt = - λN = 0.693 N/T,

Here T is half-life and the negative is showing that with time N is decreasing.

gives

dN/dt   = $0.693*1.807*10^{18}/(1.29*10^9 * 365*86400)$ dis./second

= 30.78 dis./second.