Nuclear Decay

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1 Introduction

In this research paper I will run a simulation on nuclear decay. The way the program works is that one insert the initial amount of atoms and later insert the probability of A to B and B to C, however only the data from A to B will be used and examined. In this research paper I will run a simulation on nuclear decay. The way the program works is that one insert the initial amount of atoms and later insert the probability of A to B and B to C, however only the data from A to B will be used and examined.

1.1 Hypothesis

Due to the randomness of the decay the simulation and equation would not get same number. The equotion would get inaccurate result

1.1.1 Decay constant

Decay constant, proportionality between the size of a population of radioactive atoms and the rate at which the population decreases because of radioactive decay Decay constant, proportionality between the size of a population of radioactive atoms and the rate at which the population decreases because of radioactive decay

Decay constant equation and half life

$$A = A_0 e^{-t\lambda}$$

$$0.5A_0 = A_0 e^{-\lambda T_{\frac{1}{2}}}$$

$$.5 = e^{-\lambda T_{\frac{1}{2}}}$$

$$ln(.5) = -\lambda T_{\frac{1}{2}}$$

$$-\frac{ln(.5)}{\lambda} = T_{\frac{1}{2}}$$

$$\frac{ln(2)}{\lambda} = T_{\frac{1}{2}}$$

λ *is called the decay constant and determines the rate at which the material will decay*
A is the number of undecayed radioactive nuclei present
A_0 *is the number of undecayed nuclei at time*

1.1.2 Experiment

3. Tries was made
First one used the 100 as initial amount of atoms and half life was supposedly to be

$$.69 \div 0.01 = 69$$

however the simulation showed it was 68,70 and 83 when it was halved.average =73
Second simulation used 1000 as initial amount and half life was supposed to be

$$.69 \div 0.005 = 138$$

however the result became 126, 133 and 138 average = 132
Third simulation used 10000 as an initial amount and half life was supposed to be

$$.69 \div 0.0025 = 276$$

and the simulation showed 276,271 and 277 average = 275

2 Conclusion

Through several run through the simulation it was seen that the equation and simulation had very similar result however the equation missed the actual decay often by a year, however when the number of atoms increased the result from the equation and simulation was more similar