

# Lab report on the nuclear decay

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## 1. Objective

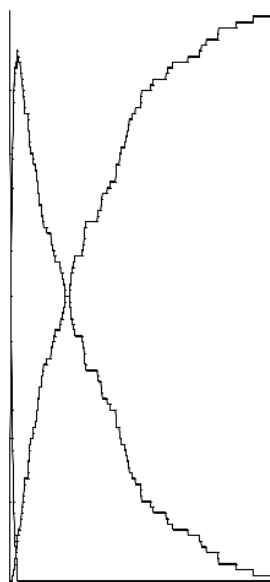
This lab introduces nuclear decay and makes students familiar with nuclear decay using Java Lab.

## 2. Nuclear Decay

Radioactive decay, also known as nuclear decay or radioactivity, is the process by which a nucleus of an unstable atom loses energy by emitting radiation. A material that spontaneously emits such radiation — which includes alpha particles, beta particles, gamma rays and conversion electrons — is considered radioactive.

## 3. Simulation

The java program introduced by the teacher helped us to view different decays for specific elements we've chosen and also the calculations in order to find the half lives and the decay rate has been introduced and used in order to get the data from java lab. I put 100 for the initial number and I putted the probability of the decay in simulation and got this graph.



#### 4. Nuclear decay half-life

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

$$\frac{A}{A_0} = \frac{1}{2} = e^{-\lambda(T_{\frac{1}{2}})}$$

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

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

By using these formulas we are able to find the half-life for our elements. What was shown in this lab was that the probability decreases twice as the half-life decreases. The middle number started decreasing in the 25<sup>th</sup> row and the last numbers started increasing, which supports this idea.

In conclusion and by looking at the graph and the data we can see that the average of the decay decreases with the same rate through whole data.

#### 5. Discussion

The graph made is an exponential function and as it is shown, the decay gets lower and lower through the graph, therefore, the rate gets smaller. Origin of the atom has a huge influence on its decay rate because by emitting radiation, the initial energy of the atom decreases.