Energy Resolution of NaI Detector

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1 Introduction

When gamma radiation passes through matter, it undergoes absorption primarily by Compton, photoelectric, and pair-production interactions. The intensity of the radiation is thus decreased as a function of distance in the absorbing medium. However, there are numerous sources of errors in any experiment, and precisely identifying these errors aids in determining the experiment's boundaries. As a result, in today's experiment, we'll use a Caesium source and a NaI detector to identify the source of an unknown gamma-ray source, and we will calculate the resolution of the NaI detector.

2 Experimental Setup & Procedure

We firstly placed the Cesium sample 2cm from the NaI detector. After some adjustments to ensure that the figure displayed was clearly visible, we left the sample long enough for the plot to be clear.

3 Data & Analysis

3.1 Gamma Spectrum

After doing the experiment, we got this graph for Cesium:

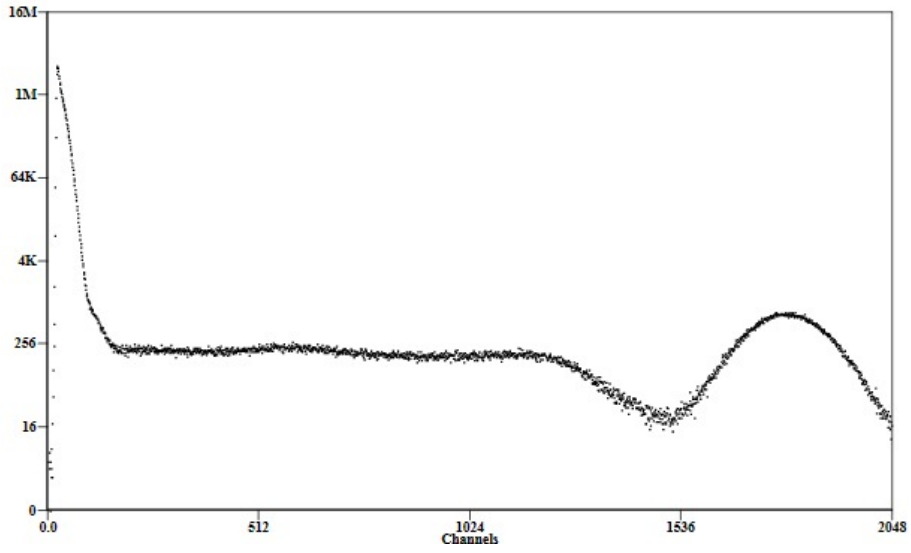

Figure 1. Cesium Gamma spectroscopy, we can see a peak at 1605

After calibrating the energy using the the graph at Figure 2, we got this plot where the peak is corresponded to the energy ≈ 700 keV

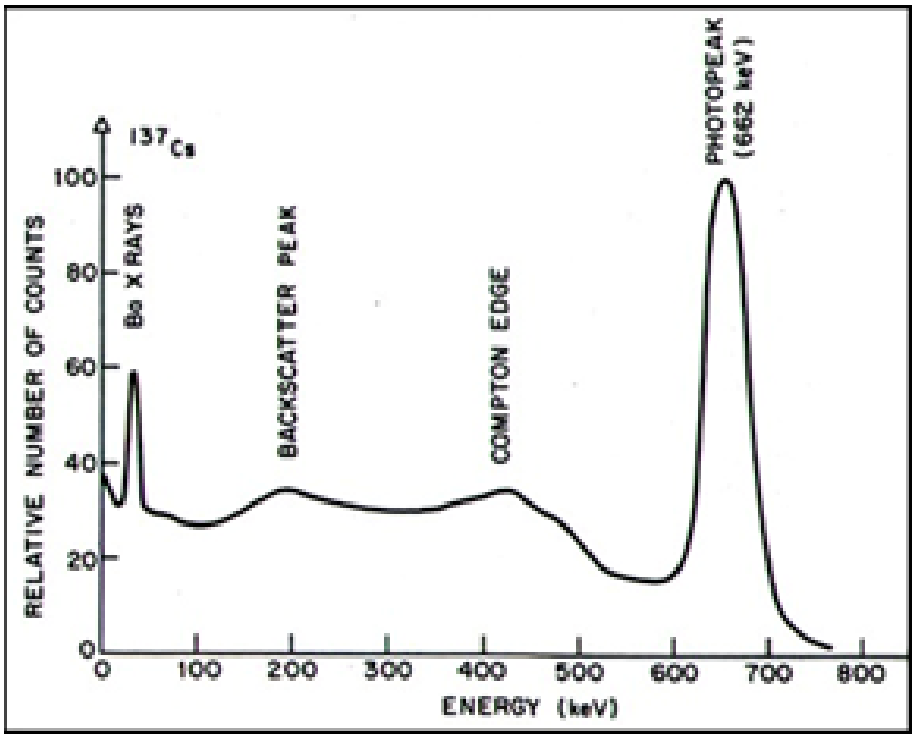

Figure 2. The graph used to calibrate the obtained graph

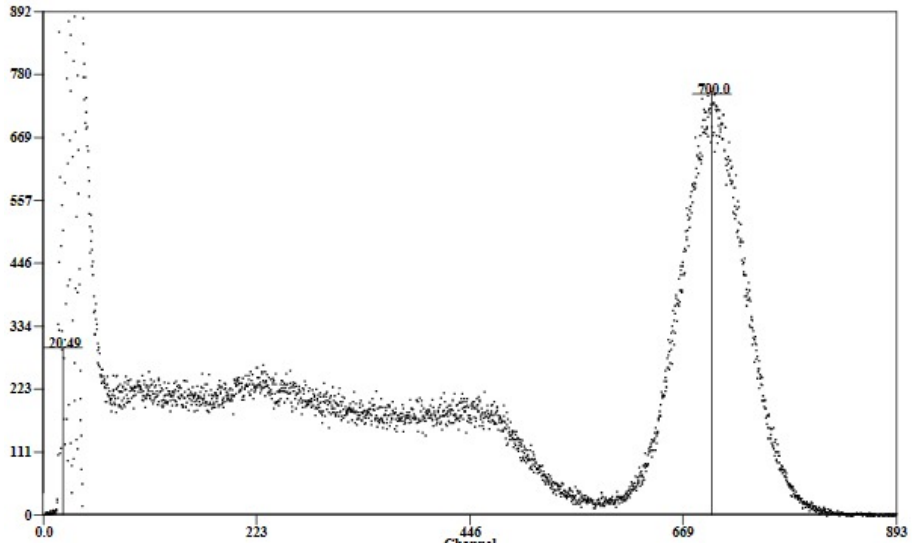

Figure 3. Final graph with correct energies

Now we will fill this table and it will give us an idea about the resolution of the NaI detector.

Event	Peak Energy (keV)	Peak Centroid (Channel)	FWHM Energy (keV)	Delta E/E
Cs Photo Peak	662	1605	371	56.10%

Table 1. Channels locations with their energy

Finally, we have this plot obtained from the group, to calibrate the energy well using different sources of gamma-ray.

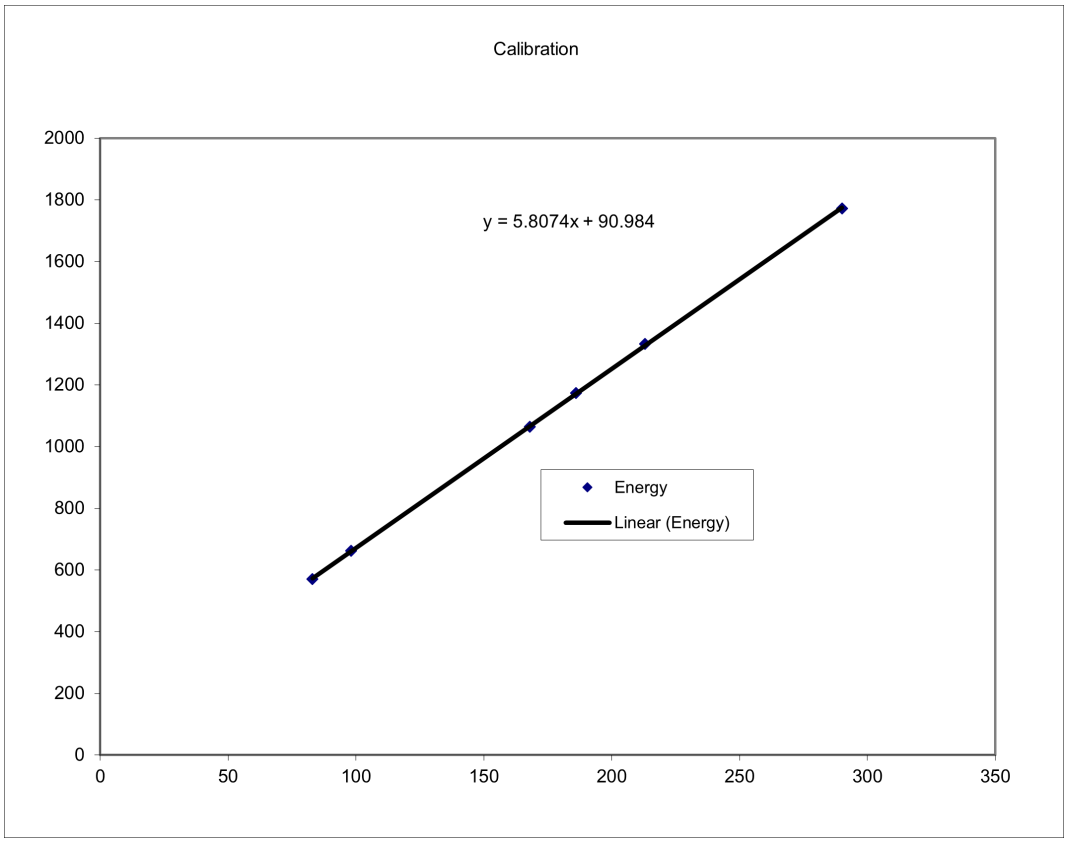

Figure 4. Energy Vs. Channel

4 Conclusion

In this experiment we have seen how we can identify gamma source based on its gamma spectrum, also we have seen and calculated the resolution of the NaI detector. Then, using different gamma sources we was able to do an energy callibration vs channels with a linear plot.