

Radiation Shielding Properties of Barite Coated Tericoton Fabric at 662 keV

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Abstract

As the technological radiation is important to be protected especially for Cesium source (¹³⁷Cs). Cesium is an radioactive source and it can come from a variety of sources in the environment. The largest one is from atmospheric due to the nuclear weapon tests, reactor waste. The cesium is also used in many different field such as in industry, medicine. Therefore protection from Cesium source is vital and daily clothes becomes important. In this work tericoton fabric was coated and tested against gamma rays obtained from Cesium source. The gamma ray shielding parameter has been measured using gamma spectrometer system contains NaI(Tl) detector.

Keywords: NaI(Tl) detector, tericoton Fabric, Barite coating

1. Introduction

As the radiation has been used in a variety of different fields nowadays it becomes important its hazardous effect. In order to protect from radiation three basic rules time, distance and shielding are used. Clothes are important for both public and also for radiation worker especially critic field such as hospital and energy power plant. Conventional fabric contains heavy element such as lead which neither comfortable nor health. An alternative way could be coating of a fabric which can be done using a variety of different materials such as plastic, plastic films etc (Akkurt et al. 2013).

In this study barite (Kılınçarslan 2012) in different rate has been used as coating materials and coated tericoton fabric. The radiation shielding properties in terms of linear attenuation coefficients have been obtained.

2. Experimental Detail

Radiation shielding properties of tericoton fabric has been measured. For this purposes barite prepared in micron scale coated to tericoton fabric and dried after coating process. The linear attenuation coefficients of coated tericoton fabric was measured at 662 keV energy gamma rays which was obtained from ¹³⁷Cs radiation source, using gamma spectrometer contains NaI(Tl) detector. A schematic view of the gamma spectrometer

system is displayed in fig 1. From the spectrum obtained from detector the linear attenuation coefficients are determined using Beer-Lambert formula;

$$I = I_0 e^{-\mu x} \quad (1)$$

Here μ is the linear attenuation coefficient, x thickness, I_0 number of gamma emitted from source and I is number of gamma hit detector.

3. Results and Discussion

In this study tericoton fabric was coated in different rate of barite and radiation shielding properties has been measured at 662 keV energies. The results of linear attenuation coefficients are displayed in Fig-2 where it can be seen clearly that the linear attenuation coefficients are increased with the increasing barite rate on coating.

The conclusion may made from this work that the barite coating on fabric is useful way to improve the radiation shielding properties of fabric.

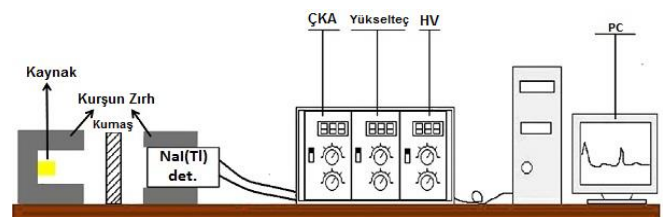


Figure 1. Gamma spectrometer.

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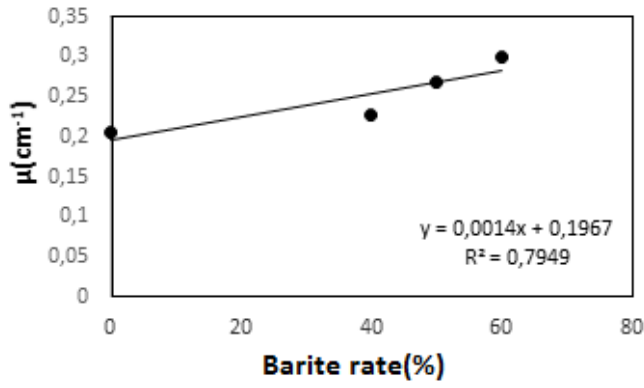


Figure 2. Linear attenuation coefficients of tericoton fabric 662 keV energies.

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References

- I. Akkurt, F. Akarslan, K. Günoğlu, Ş. Kılınçarslan, I. Serkan Uncü, H. Demiralay, Bazı kumaş türlerinin nötron zırhlama özelliklerinin incelenmesi, Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü Dergisi, 17(3),63-65, 2013.
- Ş. Kılınçarslan, S. Sancar, İ. Uzun, Barit agregalı ağır betonların betonarmede kullanılabilirliği, 6th International Advanced Technologies Symposium (IATS'11), 16-18 May 2011, Elazığ-Turkey.