World Academy of Science, Engineering and Technology
International Journal of Health and Medical Engineering
Vol:13, No:01, 2019

Adobe Attenuation Coefficient Determination and Its Comparison with Other Shielding Materials for Energies Found in Common X-Rays Procedures

Authors : Camarena Rodriguez C. S., Portocarrero Bonifaz A., Palma Esparza R., Romero Carlos N. A.

Abstract : Adobe is a construction material that fulfills the same function as a conventional brick. Widely used since ancient times, it is present in an appreciable percentage of buildings in Latin America. Adobe is a mixture of clay and sand. The interest in the study of the properties of this material arises due to its presence in the infrastructure of hospital´s radiological services, located in places with low economic resources, for the attenuation of radiation. Some materials such as lead and concrete are the most used for shielding and are widely studied in the literature. The present study will determine the mass attenuation coefficient of Adobe. The minimum required thicknesses for the primary and secondary barriers will be estimated for the shielding of radiological facilities where conventional and dental X-rays are performed. For the experimental procedure, an X-ray source emitted direct radiation towards different thicknesses of an Adobe barrier, and a detector was placed on the other side. For this purpose, an UNFORS Xi solid state detector was used, which collected information on the difference of radiation intensity. The initial parameters of the exposure started at 45 kV; and then the tube tension was varied in increments of 5 kV, reaching a maximum of 125 kV. The X-Ray tube was positioned at a distance of 0.5 m from the surface of the Adobe bricks, and the collimation of the radiation beam was set for an area of 0.15 m x 0.15 m. Finally, mathematical methods were applied to determine the mass attenuation coefficient for different energy ranges. In conclusion, the mass attenuation coefficient for Adobe was determined and the approximate thicknesses of the most common Adobe barriers in the hospital buildings were calculated for their later application in the radiological protection.

Keywords : Adobe, attenuation coefficient, radiological protection, shielding, x-rays
Conference Title : ICMPRPR 2019 : International Conference on Medical Physics, Radiation Protection and Radiobiology
Conference Location : Zurich, Switzerland
Conference Dates : January 14-15, 2019