

Measurement of Optical Exposures and Determination of Safe Distances Of Common Artificial Radiation Sources Used in Homes and Workplaces in Nigeria

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Abstract

Lighting in homes and workplaces is essential especially in places like basement and reading rooms during the day and night time. Artificial light sources such as incandescent bulbs (IBs), energy saving bulbs (ESBs) and LED lamps are common today because they are part of man lighting systems. Energy bulbs and LED lamps appear to be effective because of their low energy consumption, low heat output and optimal light output even at low wattage. This study examines the exposures arising from common bulbs used in Nigeria in the recent times. It also explores the possibility of determining the safe distance (SD) of users from each bulb to prevent overexposure. Measurement of optical radiation (Lux) was carried out on seven energy saving bulbs (ESBs) and three incandescent bulbs (IBs) (wattage range of 15-200 W) at room temperature by using calibrated Digital Luxmeter at different distances which range between 0.10 m and 1.70 m from the source. The measurement was done in a darkroom pre-tested and found to be light-proofed. Results of the investigation show that at a distance of about 0.50 m from the light sources, the optical radiations of all the bulbs to the eyes are within the safe limit for offices, hospitals and schools. It is evident from the measurement carried out on bulbs of the same wattage, but of different manufacturer that the exposures produced are different under the same condition. ESB saves four times as much energy as IB. Lower wattage ESBs produce more exposures than higher wattages IBs.

Keywords: *optical exposure, optical radiation, energy saving bulb, LED bulb, incandescent bulb, lux, artificial radiation, safe distance*