Physico-thermal characteristics and health risk evaluation of randomly selected brake pads in the Nigerian market

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Abstract
Brake pads are safety element used with other components in the braking system to control the stability of the vehicle. However, affluence of myriads of brake pads in Nigeria and the extensive brake-fade related traffic accident have led to questioning the potential safety and health hazard of the brake pads in the market. In this study, four commercial brands of brake pads commonly used were purchased and assessed. The friction linings were chiseled from the back plates and coded as AU, SN, TY and SM. The material compositions of the linings were assessed though X-Ray Difractometer; density was determined using water displacement method; shear strength, using a Tensometer; thermal conductivity by applying Fourier's Law of Heat Conduction, and thermo-gravimetric analysis, by controlled heating. The results showed that the lining materials contained copper, zinc, manganese, iron, lead and aluminium in certain proportions. Furthermore, all the linings began to decompose gradually near 400^{o}C; AU exhibited the highest thermal conductivity (2.71 W/m. K) while SM had the lowest (2.26 W/m. K); the highest true density (3.09 x 10^{3}kg/m^{3}) was found in TY while the lowest (2.04 x 10^{3}kg/m^{3}) was found in SM. The shear strength of TY and AU were 55.10 and 54.22 MPa respectively; while SM was 36.54 MPa. It was established that the physical and thermal characteristics of the pads were similar to that found in literature, but -their material composition presented serious hazard to health.

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