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## THERMOCHEMICAL CHARACTERIZATION AND SUITABILITY OF ANIMAL HORNS FOR CARBONITRIDING TREATMENT

Cow horns and hooves are abattoir wastes which have not been properly managed hitherto and their indiscriminate disposal amounts to environmental risk and pollution. However, in this work, thermochemical characterization of animal horns has been carried out to investigate their potential for carbonitriding treatment of steel. Thermogravimetric analysis (TGA) was carried out to investigate thermal behaviour of horns. Energy dispersive X-Ray spectroscopy (EDS) and Raman spectroscopy were carried out for quantification and qualification of the elements present in the horns while X-ray diffraction (XRD) was done to examine the phases present. Carbonitriding heat treatment of AISI 1018 steel was then carried out with cow horn, at 850 °C and 450 °C for carburizing and nitriding dominated processes, respectively. Vickers hardness measurement and optical microscopy were carried out on carbonitrided samples to examine the hardness profile and phase contrast in the samples following heat treatment. Thermochemical analysis revealed the presence of volatile matters and residues of up to 83% and 17%, respectively. The results of EDS confirmed presence of carbon and nitrogen in significant amount in all samples. The hardness results revealed profile indicating higher hardness value at near surface and decreasing towards the core. The suitability of animal horns for carbonitriding treatment of steel would ensure value addition and waste diminution in environment.

**Apply to be considered for a student award (Yes / No)?**

No

**Level for award (Hons, MSc, PhD, N/A)?**

N/A

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