

## Removal of Polycyclic Aromatic Hydrocarbons Present in Tyre Pyrolytic Oil Using Low Cost Natural Adsorbents

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**Abstract :** Polycyclic aromatic hydrocarbons (PAHs) are formed during the pyrolysis of scrap tyres to produce tyre pyrolytic oil (TPO). Due to carcinogenic, mutagenic, and toxic properties PAHs are priority pollutants. Hence it is essential to remove PAHs from TPO before utilising TPO as a petroleum fuel alternative (to run the engine). Agricultural wastes have promising future to be utilized as biosorbent due to their cost effectiveness, abundant availability, high biosorption capacity and renewability. Various low cost adsorbents were prepared from natural sources. Uptake of PAHs present in tyre pyrolytic oil was investigated using various low-cost adsorbents of natural origin including sawdust (shisham), coconut fiber, neem bark, chitin, activated charcoal. Adsorption experiments of different PAHs viz. naphthalene, acenaphthalene, biphenyl and anthracene have been carried out at ambient temperature (25°C) and at pH 7. It was observed that for any given PAH, the adsorption capacity increases with the lignin content. Freundlich constant  $k_f$  and  $1/n$  have been evaluated and it was found that the adsorption isotherms of PAHs were in agreement with a Freundlich model, while the uptake capacity of PAHs followed the order: activated charcoal > saw dust (shisham) > coconut fiber > chitin. The partition coefficients in acetone-water, and the adsorption constants at equilibrium, could be linearly correlated with octanol-water partition coefficients. It is observed that natural adsorbents are good alternative for PAHs removal. Sawdust of Dalbergia sissoo, a by-product of sawmills was found to be a promising adsorbent for the removal of PAHs present in TPO. It is observed that adsorbents studied were comparable to those of some conventional adsorbents.

**Keywords :** natural adsorbent, PAHs, TPO, coconut fiber, wood powder (shisham), naphthalene, acenaphthene, biphenyl and anthracene

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