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# Kinetics of Polycyclic Aromatic Hydrocarbons Adsorption on to BPAC

Himanshu Gupta\*  
Arvind Kr. Bharti\*\*

## ABSTRACT

*The adsorption kinetics and intra-particle diffusion mechanism of adsorption of polycyclic aromatic hydrocarbon (PAHs), naphthalene, fluorene and phenanthrene onto activated carbon derived from peels of banana (BPAC) was investigated in the present study. The studied pollutants are categorised under the priority pollutant category by different environmental protection agencies worldwide. The PAHs reach the aquatic systems due to a large number of household, domestic and industrial activities. Ho-McKay and Lagergren models were used to evaluate the adsorption kinetics of PAHs on BPAC. The R<sup>2</sup> values reveal the better applicability of Lagergren's model in comparison to Ho-McKay model for the adsorption of PAHs on BPAC. Intra-particle model was applied to discuss the mechanism of adsorption. The present work suggests the suitability and feasibility of BPAC for adsorption of studied PAHs. The studied mechanism of adsorption will provide useful information about adsorbent-adsorbate relation, which will be helpful for the production of studied activated carbon on a large scale.*

**Keywords:** *Pollutants, Activated carbon, Banana peel, Lagergren, Intraparticle model*

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## INTRODUCTION

One of the necessary environmental resources for sustaining human life is water. Water is also required for other purposes such as personal hygiene, clothes washing, bathing and irrigation etc. Almost, 70% of the earth is covered with water, but only a few per cent water is available to human beings as freshwater. Furthermore, the freshwater available is continuously wasted as well as contaminated due to various anthropogenic activities. A huge quantity of freshwater is utilized by various industries and in return these produce a large amount of wastewaters. The wastewaters generated consist of a variety of pollutants which

contaminates the water bodies. Therefore water conservation is a global issue which is a cause of concern for the environmentalist of the world. A solution to the problem of wastewater contamination is the proper treatment of wastewaters/effluents in the treatment plant of the industry of their source. Among the contaminants present in industrial wastewaters, polycyclic aromatic hydrocarbons (PAHs) are one of the categories of environmental pollutants. Petroleum as well as coking industries is examples of industries which release wastewater containing PAHs (Janosz-Rajczyk et al., 2014; Smol et al., 2012; Zhang, 2012; Sponza & Oztekin, 2010; Buseti et al., 2006). Some industrial effluents are also reported to be contaminated by PAHs (Gupta, 2018). Various

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\*Department of Chemistry, Indian Institute of Technology Roorkee, Roorkee, U.K., India

\*Department of Chemistry, School of Sciences, IFTM University, Moradabad, U.P., India

\*\*Department of Applied Chemistry, Faculty of Science, University of Johannesburg, Johannesburg, South Africa

\*Corresponding author: hims.research@gmail.com

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