

Air Pollution and Public Health: Challenges, Interventions and Sustainable Solutions

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Contents

<i>Foreword</i>	<i>v</i>
<i>Introduction</i>	<i>ix</i>
<i>Preface</i>	<i>xi</i>

SECTION I: Air Pollution—Effects and Mitigation

1. Fossil Fuels and Air Pollution <i>James G. Speight (USA)</i>	3
2. Bio-valorization of Organic Waste Biomass into Different Valuable Products as Out-of-Box Approaches for Mitigation of Air Pollution <i>Nour Sh. El-Gendy and Hussein N. Nassar (Egypt)</i>	28
3. Effect of Air Polycyclic Aromatic Hydrocarbons in Food Chain: Direct and Indirect Exposure <i>Kavita Verma and Varvika Mathur (India)</i>	141
4. Reducing Carbon Dioxide Emissions through the Production of Synthetic Natural Gas <i>Radwa A. El-Salamony (Egypt)</i>	157
5. Air Pollution Mitigation using Artificial Intelligence: A Review <i>Lalita Josyula, Shounak Chakraborty, Akanshu Mahajan, Varun Bharti and Pradeep (India)</i>	176
6. Impact of Air Pollution on Public Health: Current and Future Challenges <i>Surya Prakash Bhatt and Randeep Guleria (India)</i>	216
7. Effects of Rising Air Pollution on Public Health and Measures Adopted Globally to Improve Air Quality <i>Keerti Mishra (India)</i>	237
8. Air Pollution Abatement Technologies: A Brief Introduction on Filters, Membranes and Coatings <i>C.P. Leo (Malaysia)</i>	254

Effect of Air Polycyclic Aromatic Hydrocarbons in Food Chain: Direct and Indirect Exposure

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ABSTRACT: Polycyclic aromatic hydrocarbons (PAH) are ubiquitous, semi-volatile and persistence organic pollutants that are highly resistant to degradation and considered as major carcinogenic pollutants present in the environment. In the last few decades, air PAH concentration has increased rapidly due to various anthropogenic activities. In higher trophic levels, majority of PAH exposure takes place directly through respiration, dry or wet deposition, whereas indirect exposure takes place due to decreased PAH assimilation at lower trophic level, which transfers to the higher animals through food chain. This study discusses the exposure and transfer of PAH to different trophic levels, their effect on the food chain and some of their bioremediation methods. Plants are known to accumulate around 40% of the PAH present in the environment. In most of the plants, PAH get absorbed from air by deposition in their waxy cuticle and affect plant germination, morphology, photosynthesis and physiology. PAH accumulation ultimately leads to phytotoxicity. These drastic changes can also influence microbial communities associated with plants. In humans and animals, the exposure takes place generally by inhalation of polluted air, direct dermal contact and through ingestion of PAH affected food. This leads to carcinogenic, morphogenic and mutagenic effects. Methods for removal of PAH from environment include photo-oxidation, chemical oxidation and biological degradation. Animals, plants and microbes have the ability to metabolize PAH through various enzymatic activities. However, the actual mechanism is still unclear. Microorganisms such as Pseudomonas, Micrococcus and Staphylococcus strains utilize PAH as a carbon source and degrading them via salicylate pathway or P-450 monooxygenase activity, thus, they are being utilized for bioremediation of PAH. However, standardization and effectiveness of these techniques
