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**Name of the Scholar :** Adnan Shahzaib

**Name of the Supervisor :** Prof. Nahid Nishat

**Name of the Department/Centre :** Chemistry

**Topic of research :** Development and Application of Metal-Organic frameworks utilizing bioresources

### **Findings**

The culmination of my Ph.D. research, spanning six chapters, has yielded significant insights into the realm of Metal-Organic Frameworks (MOFs) and their diverse applications. Chapter 1 provides a comprehensive literature review on MOFs and their subclass, Biological MOFs. Emphasizing the importance of metal ions and organic linkers, the chapter explored the potential of Bio-MOFs in various fields. Chapters 2 and 3 detailed the synthesis and application of Cu- $\beta$ -CD-MOF and Ni- $\beta$ -CD-MOF, respectively, as catalysts exhibiting remarkable catalytic efficiency for the reduction of nitroaromatic compounds and dyes. Chapter 4 introduced a novel Aspartic-based MOF, LAsp-MOF-Co, showcasing multifunctionality. This MOF exhibited significant catalytic efficacy in reducing the carcinogenic Methyl Orange dye and displayed notable antimicrobial activity. Chapter 5 delved into the synthesis of curcumin-based MOFs with Ni and Co metals, highlighting their promising catalytic properties for the reduction of nitroaromatics, dyes, and hexavalent chromium metal. The final chapter, Chapter 6, focused on the green synthesis of Fe<sub>3</sub>O<sub>4</sub>/ZIF-67@ZnO composite, showcasing its potential as an efficient catalyst for reducing Rhodamine and Methylene Blue dyes, emphasizing its applicability in environmental remediation. Overall, my research contributes to the evolving landscape of MOFs, offering insights into their synthesis, characterization, and diverse applications in catalysis and environmental remediation.