

**Frontiers in Pharmaceutical, Material, and  
Environmental Sciences: Innovative Approaches  
and Applications**

**Editors**

**Tahmeena Khan**

**Qazi Inamur Rahman**

**Nafees Ahmad**

**Shahla Tanveer**

*Department of Chemistry,  
Integral University, Lucknow*



No part of this publication may be reproduced, transmitted or stored in a retrieval system, in any form or by any means, electronic, mechanical, photocopying recording or otherwise, without the prior permission of the author.

**Published by: - Book Rivers**

**Website: - <https://www.bookrivers.com>**

**Email: [publish@bookrivers.com](mailto:publish@bookrivers.com)**

**1<sup>st</sup> Print Edition - 2026**

**Copyright©: Editors**

***Title: Frontiers in Pharmaceutical, Material, and Environmental Sciences: Innovative Approaches and Applications***

***Editors: Tahmeena Khan, Qazi Inamur Rahman, Nafees Ahmad, Shahla Tanveer***

**All Rights Reserved**

**ISBN: 978-93-6884-630-7**

**MRP: 370/-INR**

---

**(Printed in India)**

## Contents

**Chapter 1** Formulation and Evaluation of Telmisartan Sustained-Release Tablets **1 - 18**

*Suraj Kumar, Mohd Arsh Khan, Sabahat Yasmeen Sheikh, Firoz Hassan*

- Introduction
- Method of Preparation of Granules and Tablets
- Hypertension
- Mechanism of Action
- Preparation of tablets by direct compression
- Drug Profile
- Conclusion

**Chapter 2** Synthesis of p-Toulenesulfonylisocyanate and amines with acetonitrile solvent **19 - 30**

*Afifa Baig, Mohd Arsh Khan, Fiza Farooqui, Malik Nasibullah, Jamal Akhtar Ansari*

- Introduction
- Material and Method
- Result and Discussion
- Conclusion

**Chapter 3** Nanoparticle-Mediated Removal of Polycyclic Aromatic Hydrocarbons (PAHs) **31 - 52**

*Hammnah Ali, Naseem Ahmad, Arshad Iqbal, Nafees Ahmad, Abdul Rahman Khan, Iqbal Azad*

- Introduction
- Nanotechnology
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Environmental Protection Agency (EPA)
- Conclusion

**Chapter 4** Coumarin: A Versatile Therapeutic Agent **54 - 64**

*Mohammad Imran Ahmad*

- Introduction
- Classification of Coumarins
- Pharmacological Applications of Coumarin
- Conclusion

**Chapter 5** Synthesis of oxindole Schiff's base derivatives: Drug likeness and ADMET Studies **65 - 78**

*Mohammad Amir, Ayesha Anwer, Umme Habiba Malik, Malik Nasibullah*

- Introduction
- Review of Literature
- Chemistry of Oxindoles
- Result and Discussion
- Computational chemistry
- Conclusion

**Chapter 6** Fabrication, characterization and adsorption kinetics of Polyaniline towards organic pollutant **79 - 88**

*Fiza Khan, Amrita, Adeeba Meraj, Nafees Ahmad*

- Introduction
- Contaminants removed by Polyaniline
- Synthesis of Polyaniline (PANI)
- Results and discussion
- Conclusion

**Chapter 7** Influence of Plasticizers on Thermoplastic Starch (TPS) Properties developed from Polystyrene **89 - 100**

*Suneel, Devendra Pratap Mishra*

- Introduction
- Synthesis of Thermoplastics starch (TPS) and Sheet
- Characterization
- Thermogravimetric analysis
- Conclusion

**Chapter 8** Extraction of Piperine from Black Pepper **101 - 118**

*Saimah Khan, Zeba Ali Mumtaj, Mohd Arsh Khan*

- Introduction
- Materials and methods
- Methods of extraction of Piperine
- Isolation
- Result and Discussion
- Conclusion

**Chapter 9** Removal of Orange G and Heavy Metals using Chitosan-coated Bamboo Biochar **119 - 137**

*Abdul Faiz Ansari, Iqbal Azad, Naseem Ahmad*

- Introduction
- Materials and methods
- Result and Discussion
- Conclusion

**Chapter 10** Synthesis and Characterization of some Thiosemicarbazones and their Complexes **138 - 155**

*Atiya Khan, Tahmeena Khan*

- Introduction
- Metal ligand complexes and their utility
- Transition metal complexes
- Transition metal complexes of thiosemicarbazones
- Antifungal activity
- Antiviral activity
- Computational Drug likeness assessment
- Conclusion

**Chapter 11** An Introduction to Chalcone Derivatives as Antimicrobial Agents **156 - 172**

*Chandra Shekhar Yadav, Minaxi B. Lohani*

- Introduction
- Naturally occurring chalcones
- Synthetic chalcones
- Chalcones with antimicrobial activity
- Future aspects
- Conclusion

## Chapter – 5

### Synthesis of oxindole Schiff's base derivatives: Drug likeness and ADMET studies

Mohammad Amir<sup>1</sup>, Ayesha Anwer<sup>1</sup>, Umme Habiba Malik<sup>1</sup>, Malik Nasibullah<sup>1\*</sup>

<sup>1</sup>Department of Chemistry, Integral University, Lucknow (U.P.), India

\*Corresponding email: malik@iul.ac.in

#### Abstract

Our research goes to the synthesis of oxindole derivatives as newly drug-like small molecules. However, we synthesized oxindole-Schiff's bases (3a–b) and demonstrated computational chemistry and comparative studies with the standard multi-purpose FDA-approved Bevacizumab anticancer drug. All the synthesized compounds (3a and 3b) were characterized using UV and FT-IR spectral analysis. Further the drug-likeness properties of the synthesized compounds were demonstrated through *in-silico* studies as a preliminary investigation. We found that synthesized compounds showed drug-like properties due to the molecular weight (M.W. < 500 Da), the number of H-bond donors (HBDs: < 5), H-bond acceptors (HBAs: < 10), rotatable bonds (<10), topological polar surface area (TPSA) not higher than the thresholds of 140 Å<sup>2</sup>, and the octanol-water partition coefficient (Log P) not exceeding the value of 5 constitute a number of these descriptors. In the future, the newly synthesized oxindole derivatives could be analyzed as anticancer properties against various cancer cell lines through *in-vitro* as well as *in-vivo* studies.

**Keywords:** Oxindole, Schiff base, ADMET, drug-likeness

- [14] Van Beijnum, J. R., Huijbers, E. J. M., van Loon, K., Blanas, A., Akbari, P., Roos, A., Wong, T. J., Denisov, S. S., Hackeng, T. M., Jimenez, C. R., Nowak-Sliwinska, P., & Griffioen, A. W., (2022). Extracellular vimentin mimics VEGF and is a target for anti-angiogenic immunotherapy. *Nature Communications* 2022 13:1, 13(1), 1–20
- [15] Wang, X., Liu, J., Xu, L., Hao, Z., Wang, L., & Xiao, J., (2015). Friedel–Crafts alkylation of heteroarenes and arenes with indolyl alcohols for construction of 3,3-disubstituted oxindoles. *RSC Advances*, 5(123), 101713–101717
- [16] Waring, M. J., Ben-Hadda, T., Kotchevar, A. T., Ramdani, A., Touzani, R., Elkadiri, S., Hakkou, A., Bouakka, M., & Ellis, T., (2002). 2,3-Bifunctionalized quinoxalines: synthesis, DNA interactions and evaluation of anticancer, anti-tuberculosis and antifungal activity. *Molecules*, 7(8), 641–656
- [17] Yu, Q., Guo, P., Jian, J., Chen, Y., & Xu, J., (2018). Nine-step total synthesis of (-)-strychnofoline. *Chemical Communications*, 54(9), 1125–1128
- [18] Zhang, J. L., Ye, W. L., Zhang, J., Hu, X. Q., & Xu, P. F., (2021). Enantioselective Construction of Polycyclic Indazole Skeletons Bearing Five Consecutive Chiral Centers through an Asymmetric Triple-Reaction Sequence. *Organic Letters*, 23(13), 5033–5038
- [19] Zhao, Y. H., Le, J., Abraham, M. H., Hersey, A., Eddershaw, P. J., Luscombe, C. N., Boutina, D., Beck, G., Sherborne, B., Cooper, I., & Platts, J. A., (2001). Evaluation of human intestinal absorption data and subsequent derivation of a quantitative structure - Activity relationship (QSAR) with the Abraham descriptors. *Journal of Pharmaceutical Sciences*, 90(6), 749–784.