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Editorial

From molecular insights to sustainable solutions: Advancing chemical research for health, environment, and industrial innovation

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The second issue of Volume 10 (2026) of ChemClass Journal, the official publication of the Chemical Society of Nigeria, Zaria Chapter, highlights the remarkable breadth and transformative potential of contemporary chemical sciences. At a time when global challenges demand innovative, evidence-based, and sustainable solutions, chemistry remains central, linking scientific discovery to practical applications across health, agriculture, industry, environmental stewardship, and technological development.

Chemistry has long held a unique place among the sciences, bridging fundamental understanding of matter with transformative solutions to real-world challenges. Whether addressing emerging public health concerns, designing environmentally benign technologies, developing novel materials, improving agricultural productivity, or advancing industrial processes, chemistry provides the molecular foundation for sustainable innovation. The contributions in this issue demonstrate not only the diversity of ongoing chemical research but also its growing interdisciplinary influence in addressing problems of national and global significance that are imperative for improving human well-being and safeguarding our environment.

This issue brings together 15 carefully selected contributions spanning analytical, natural products, computational, medicinal, environmental, materials, agricultural, and green industrial chemistry. Although diverse in their immediate objectives, these studies share a common aspiration: to translate molecular understanding into practical solutions to some of today's most pressing societal needs.

Natural products remain one of chemistry's richest sources of innovation, and several contributions in this issue illustrate their expanding relevance beyond traditional medicinal applications. In **Williams et al.'s** "*Phytochemical Composition and Antioxidant Properties of Corchorus olitorius Leaves and Azanza garckeana Seeds: Implications for Phytocosmetic Applications*," indigenous botanical resources were investigated for their antioxidant potential, offering compelling evidence for their use in next-generation phytocosmetic formulations. Complementing this work, **Ehisuoria et al.'s** study, "*Anti-sickling and Antioxidant Properties of Canna indica, Pergularia daemia and Parquetina nigrescens Leaves*," explores the anti-sickling and antioxidant activities of medicinal plants long used in traditional healthcare systems, thereby strengthening the scientific basis for future phytopharmaceutical development. The chemistry of food and nutrition also holds a central place in this edition. **Oloyede et al.,** in "*Foliar Application of Organic Liquid Nutrient Affects Selected Vitamins and Antioxidants in Two Basils (Ocimum gratissimum L. and Ocimum basilicum L.)*", demonstrate how sustainable agronomic interventions can enhance the nutritional and phytochemical quality of economically important herbs.

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Similarly, **Modibbo and Tama,** in "*Proximate Composition and Mineral Content of Cassia tora L. Leaves*," reveal the nutritional richness of an underutilised indigenous vegetable, reinforcing the growing recognition that local biodiversity can meaningfully contribute to food security, improved nutrition, and sustainable diets. Extending this theme to edible oil quality, **Oloyede et al.,** in "*Effects of Processing Methods on Fatty Acid Composition of Three Sesame (Sesamum indicum L.) Cultivars*", provide valuable insights into how processing conditions affect the preservation of health-promoting fatty acids, with important implications for the food processing industry and consumers alike.

A defining characteristic of modern chemistry is its commitment to replacing environmentally hazardous materials with safer, renewable alternatives. This philosophy of green chemistry is evident throughout the present issue. **Manzo et al.'s** "*Evaluation of the Corrosion Inhibition of Senna occidentalis and Polyalthia longifolia Leaf Extracts on Reinforced Steel in 2 M HCl Solution"* demonstrates that naturally occurring phytochemicals can serve as highly effective corrosion inhibitors, offering environmentally sustainable alternatives to conventional synthetic inhibitors. Likewise, **Modibbo and Kabir's** "*Production and Evaluation of Mosquito Repellent Coil Using Orange (Citrus sinensis) Peel Extract*" transform agricultural waste into a practical public health intervention, illustrating how chemical innovation can simultaneously promote waste valorisation, household health, and environmental sustainability.

The environmental dimension of chemistry is equally evident across several studies. **Alexander et al.'s** "*Substrate Composition Effects on Black Soldier Fly Larvae Growth and Bioconversion: A Meta-analysis Review*" synthesises international evidence on optimising organic waste conversion within circular economy systems, highlighting chemistry's contribution to sustainable resource recovery. In parallel, **Ameh et al.'s** "*Biodegradation of Naphthalene, Phenanthrene, and Pyrene by Four Indigenous Fungal Species Isolated from Petrochemical Refinery Effluent*" demonstrates the remarkable capacity of indigenous microorganisms to remediate hazardous polycyclic aromatic hydrocarbons, reinforcing the expanding role of bioremediation in environmental management.

Environmental monitoring and pollution assessment continue to benefit immensely from analytical chemistry. **Magashi et al.,** in "*Effect of Vegetable Oil Industrial Effluent Discharge on the Physiochemical Properties of Agricultural Soil*," provide an evidence-based evaluation of the effects of industrial activities on soil quality, while **Ajaga et al.** "*Evaluation of Irrigation Water Quality from Major Water Sources in Gboko Local Government Area of Benue State, Nigeria*" assess the suitability of regional water resources for sustainable agriculture. Together, these investigations underscore the indispensable role of chemical measurements in informing environmental policy, regulatory compliance, and natural resource management.

Analytical chemistry also plays a critical role in protecting human health. **Bankole et al.'s** "GC-MS Analysis of Chemical Compounds in Aqueous and Precipitate Extracts of Nicotiana tabacum Leaves" employs advanced chromatographic techniques to characterise potentially hazardous constituents of tobacco, providing valuable chemical evidence that informs toxicological research and public health awareness.

Materials chemistry and catalyst development receive significant attention in **Omoruyi and Unuigbe's** study, which investigates the "*Effect of Acid Concentration on the Surface and Structural Properties of HCl-Modified Natural Clay*". Their systematic investigation demonstrates that controlled structural modification can optimise surface properties for adsorption and catalytic applications, thereby expanding opportunities for the use of locally sourced functional materials in industrial processes.

Perhaps one of the most striking features of this issue is the growing integration of computational chemistry into chemical discovery. **Adeboye's** "*Computational Modelling of Kinetics and Thermodynamics of Eco-friendly Dimerisation of Cyclopentadiene*" illustrates how theoretical modelling can identify energetically favourable reaction pathways that reduce energy consumption and support greener chemical synthesis. Similarly, **Fakuade et al.'s** "*Computational Identification and Validation of Novel Inhibitors Targeting LLM Genes in Staphylococcus aureus for Antimicrobial Drug Development*" demonstrate the immense promise of computational drug discovery, in which molecular docking and simulation accelerate the identification of promising antimicrobial candidates before laboratory validation.

Collectively, the studies in this issue reflect a significant evolution in chemical research. No longer confined to isolated laboratory investigations, chemistry today serves as an enabling science that informs healthcare, environmental conservation, industrial productivity, food systems, computational biology, and sustainable development. Across every contribution, there is a shared commitment to innovation that is scientifically rigorous, socially relevant, and environmentally responsible.

ChemClass Journal remains committed to promoting high-quality scholarship that advances both fundamental knowledge and practical applications. We continue to encourage multidisciplinary research that harnesses the chemical sciences to address complex challenges facing Nigeria, Africa, and the global scientific community.

We express our sincere appreciation to all authors whose valuable contributions have enriched this issue. We also acknowledge our reviewers for their professionalism, critical insights, and unwavering commitment to upholding the journal's scientific integrity. We greatly appreciate the technical publishing support from SIRONigeria Global Limited in the transformation of this journal towards global visibility and indexing. The Editorial Board remains grateful to the Chemical Society of Nigeria, Zaria Chapter, for its continued support and dedication to advancing chemical scholarship.

As readers engage with the articles in this issue, we hope they recognise not only the scientific merit of the individual studies but also the broader narrative they collectively convey: that meaningful progress begins with molecular insight, but its greatest impact is realised when that knowledge is translated into sustainable solutions that improve lives, protect

ecosystems, and drive industrial innovation. This vision continues to shape the mission of ChemClass Journal and inspires our commitment to fostering excellence in chemical research.

Author Contributions

VOA conceptualised the editorial. SIRO prepared the original draft. Both VOA and SIRO contributed to the review and editing of the manuscript. TG provided supervision. Both authors approved the final version for publication.

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Conflict of Interest

The authors declare no conflicts of interest beyond serving as editors of the journal

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