

From bench to bedside: The Transformative Power of Derivatisation

Inaugural lecture

by

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Abstract

The main focus of the inaugural lecture is on the development and application of solution and resin bound (or solid-phase) derivatisation reagents for analysis of some different functionalities of analytical and environmental importance. The focused was on Chromatographic analysis and Pollution monitoring. In the chromatographic method, the lecture discloses how derivatisation has ensures a reliable, accurate and robust detection. The earliest contribution using this approach is the extraction of levamisole (2,3,5,6-tetrahydro-6-phenylimidazole(2,1-b) thiazole) from Ketrax^R and the derivatisation of the extract to nitro-derivative for GC determination. This contribution provided accurate and reproducible measurements that could be adapted for routine investigation of levamisole in human plasma, urine and food of animal origin.

An extension of the derivatisation is the synthesis of reagents that were utilized to derivatise, amines (¹⁰&²⁰ precursors of carcinogenic nitrosoamines), amino acids, fatty acids, alcohols phenols and some clinically important drugs like Ketrax^R (an anthelminthic), proguanil, sulphadoxine-pyrimethamine, artemeter-lumefantrine amodiaquine and artesunate (antimalaria drugs), also, fatty acids (precursors of biologically important prostaglandins), all been determined at trace levels. This technique provides valuable contributions to knowledge, and have helped in pharmaceutical quality control and purity assessments. Also, it ensures that medicine administered to patient actually contained the intended active ingredients at appropriate levels. These contributions were elucidated in published journal articles.

Furthermore, the lecture discloses an extension of the study in the investigation of selected antibiotics (chloramphenicol, oxytetracycline, doxycycline, chlortetracycline

and oxytetracycline) in poultry, and catfish as contributions to public health protection and sustainable development. In addition, the lecture captures the analysis of phthalate esters in real human biological samples obtained from transfused mothers from selected government hospitals; the study provided evidence of phthalate esters exposure associated with materials used in blood transfusion and also discloses possibility of maternal transfer through breast milk to nursing infants. This work illustrates the transformative power of analytical chemistry: a laboratory-based analytical procedure becomes a tool for identifying exposure pathways associated with clinical practice, assessing potential health risks and generating evidence relevant to protection of mothers and infants. In another investigation, the lecture reveals how the concentration of diethyl-hexyl phthalate leached from packaging bags into physiological saline solution. The result of this study projects a viable source of exposure to phthalates esters to recipient of the physiological saline solution.

Focusing on pollution monitoring, the lecture emphasized how key pollution indicators were investigated in an environmental matrix, with the view to understand the status of pollution due to industrial and anthropogenic activities. The investigations focused on pollutants such as phthalates, diclofenac, ibuprofen sulfadoxine, sulfsmethazine trimethoprim, and organic UV filters discharged as effluents into receiving rivers in southwestern Nigeria. Evidences were provided to substantiate pollution of the environment by these industrial wastes which were indiscriminately discharged into rivers and waterways. The lecture calls for urgent need to develop strategies for compliance in treatment and discharge of wastes into river water.

