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Entitled

*ANALYSIS OF PHARMACEUTICAL RESIDUES IN WASTEWATER FROM A AIN, UNITED ARAB EMIRATES USING LIQUID CHROMATOGRAPHY-TANDEM MASS SPECTROMETRY AND CIRCULAR DICHROISM:POTENTIAL HAZARDOUS EMERGENT CONTAMINANTS*

by

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Abstract

Although water is the second essential substance to life after air, clean water resources in many regions of the world have become limited because of climate change, establishing rivers' dams and contaminations with hazardous life-threatening chemicals. Pharmaceutical residues in aquatic environments have been recognized as emerging contaminants causing adverse ecological and human health risks. Hundreds of pharmaceutical compounds and their metabolites were found in surface, underground, drinking and sewage waters in many countries. In United Arab Emirates, millions of drugs' dosages are annually used for human, poultry, and veterinary treatments. Drugs execrated as unchanged, metabolites or excesses can find their fates in wastewater's drainage systems. Due to its high persistence, they are not eliminated by wastewater's treatment processes and discharged into recipient waters or leached on soil and reach ground and drinking waters. Subsequent uptakes of water containing these biologically active compounds can cause harmful effects to human health and ecology. Challenges in quantifying pharmaceutical residues in aquatic environments include their presence at trace concentrations, complexity of their matrices and the need for efficient extraction techniques. In this work, new methods based on liquid chromatography mass spectrometry (UPLC-MSMS) and circular dichroism (CD) were developed and validated for determining 18 antibiotics and anti-inflammatory drugs in wastewater from Al Ain. The results obtained proved the reliability of developed methods in determining target compounds with recoveries of $\geq$ 85 %, linear correlation coefficients of $\geq$ 0.99, dynamic ranges of 0.5–3000.0 ppb, accuracies of 98-102.8%, inter-day precision of 1.85-10.48%, and intra-day precision of 1.41-18.28%. The results proved also that the developed CD method was simple, inexpensive, selective, and sensitive with LOD of 0.36-8.46 ppb. Application of developed methods on effluent wastewater from Al Ain over nine months revealed the presence of nine drugs at concentrations 0.9-17.39 ppb. Variations in concentrations of different drugs were correlated with time, stability, and rate of consumption.

**Keywords:** Emerging contaminants, pharmaceuticals, antibiotics, anti- inflammatory, UPLCMS-MS, CD, solid-phase extraction, liquid-liquid extraction. Wastewater