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# Presence of Residues and Metabolites of Pharmaceuticals in Environmental Compartments, Food Commodities and Workplaces: A Review Spanning the Three-Year Period 2014 -2016

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## **Abstract**

Residues and metabolites of pharmaceuticals can pollute environmental compartments, food commodities and workplaces, thus posing a serious threat to human health and environmental integrity. Needless to say, this challenge is increasingly attracting the attention of the international scientific community, the decision makers and the layman. Much concern has been expressed over the past few years over the deleterious consequences of the discharge of medicinal products, often as unused or expired products, into the various environmental compartments, to say nothing of their occurrence in foodstuff and feedstuff and of their undue presence in the workplace. This widespread presence inescapably raises a number of questions among which of prime importance is the reliable quantification of such residues and metabolites in the various media in order to assess whether and to what extent they can endanger biota and humans.

This work summarizes the key findings of an overview of the scientific literature in this field approximately over the past three years (2014 - 2016) with particular regard to the most fit-for-purpose analytical approaches currently resorted to for the detection, identification and quantification of residues of medicinal products in the most diverse matrices along with the assessment of their noxious potential. A total of almost 1000 papers, reports and other publicly available documents published in the said period were scanned.

## **Introduction**

Evidence of the release into the environment of residues of pharmaceuticals began to accrue in the early years of the XXI century. Medicinal products are by definition biologically active and resistant to biodegradation. Residues and metabolites of pharmaceuticals can thus significantly pollute the environment, food commodities and workplaces and pose a serious threat to human health and the environment. This challenge is increasingly attracting the attention of the scientific community, the decision makers and the layman alike.

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