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Mass-spectrometry; a significant technique to solve mysterious crimes in forensic sciences: Cases and solutions

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Forensic science is the most important branch in investigating crimes. The analysis of poisons present in autopsy material is very tedious work. But, mass spectrometry technique makes it possible in few minutes programming to analyze poisons and to help in solving crimes. Mass spectrometry technique helps us in many cases. The analysis of large number of drugs, insecticides, volatiles poisons and many numerous compounds are quite tedious but by use of mass spectrometry it is not only easy to detect poisons but also the molecular structure responsible for the deaths in suspected matters enhances its utility in acceptance of the reports in court of law. There are numerous cases where by use of mass spectrometry, we have solved several important cases. The use of mass spectrometry becomes highly significant in solving crimes. One such case where criminal used anti-psychotropic drug for absconding from police custody at Ajmer will be explained. The role of police person's involvement in execution of this event was questionable and was solved by use of mass spectrometry. In India, the criminals are using various sorts of unknown drugs, insecticides and other compounds to execute criminal activities. Mass spectrometry can solve number of such cases. In fact, it has been widely used in forensic sciences and in many scientific academic institutions. Its significance, uses and future scopes will be elaborated in terms of use in forensic sciences.

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Bioactive compounds of coffee pulp and cocoa pod: Valorisation as food ingredient analysed using high performance liquid chromatography

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Each year the agrifood industry produces millions of waste or by-products from crops which could be valorized for its bioactive compounds. High performance liquid chromatography (HPLC) and UV-Vis spectrophotometer were used as powerful analyzing tool. The aim of this study were to determine and compare the effect of different extraction methods on the availability of bioactive compounds i.e. total phenolic content (TPC), chlorogenic acid (CGA) content and antioxidant activity that was measured by ferric reducing antioxidant power (FRAP) assay and DPPH radical scavenging activity of coffee pulp (CFP) and cocoa pod (CCP). The extraction applied was solvent extraction (SE) and ultrasound-assisted extraction (UAE) method, both by applying 80% ethanol, for 2.5 hours at 40°C. The UAE method gives higher value of TPC in CFP (6.285 mg/g) and CCP (4.808 mg/g), and higher antioxidant activity measured by FRAP assay for both CFP and CCP with value 3.508 mg/g and 2.454 mg/g, respectively. The SE method on the other hand gives higher but no significant different value of CGA content, 27.122 mg/g sample in CFP and 0.249 mg/g sample in CCP and higher antioxidant activity measured by DPPH radical scavenging assay in CFP (73.4275%) and CCP (87.523%). In comparison, the UAE method is more effective than SE as it can recover higher TPC, antioxidant activity (FRAP assay) and no significant different in CGA value compared to the SE method for both CFP and CCP sample.

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