

Comparison of supercritical fluid extraction and Soxhlet extraction for the determination of DDT, DDD and DDE in sediment

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Abstract

Sediment containing incurred DDT, DDD and DDE residues was extracted using supercritical fluid (CO₂) extraction (SFE) and Soxhlet extraction. The two extraction techniques were compared. Samples were collected from the Pongolo floodplain in KwaZulu-Natal and the Letaba River in Mpumalanga, South Africa. The sediment samples were freeze-dried, sieved, extracted and analysed by GC-MS for their DDT, DDD and DDE content. Validation of the GC-MS method was done against a reference standard. The paired t-test and two-way analysis of variance (ANOVA) without replication were used for the statistical evaluation of the two extraction techniques. Results of the paired t-test and two-way ANOVA showed that there is no evidence that SFE differs significantly from Soxhlet extraction for the determination of the three compounds. SFE can be used to replace Soxhlet extraction for the extraction of DDT, DDD and DDE from sediment. The determined limits of detection (LODs) were lower than the calculated suggested EP-based SQC for DDT, DDD and DDE making GC-MS coupled to SFE a useful method for the determination of the three compounds in sediment.