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Dechloranes: The next Emerging POP?

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Dechloranes such as Dechlorane Plus (DP, C₁₈H₁₂Cl₁₂), Dechlorane 602 (Dec 602, C₁₄H₄Cl₁₂O), Dechlorane 603 (Dec 603, C₁₇H₈Cl₁₂), Dechlorane 604 (Dec 604, C₁₃H₄Br₄Cl₆) and Chlordene Plus (CP, C₁₅H₆Cl₁₂) possess flame retardant properties similar to Mirex. Whereas the use of DP as a flame retardant (electrical wires, cables coating, computers and polymers) is well established, little information is available for the use of the other dechloranes. All these compounds are unregulated compounds and represent a possible alternative to other regulated FRs such as the polybrominated diphenyl ethers (PBDEs).

The environmental occurrence of dechloranes was first reported in 2006 in North America when DP was detected in air, sediment and fish samples from the Laurentian Great Lakes (Hoh et al., 2006). In 2010, other dechloranes such as Dec 602, 603 and 604 were reported in sediment and fish samples from the same area (Shen et al., 2010). CP was later detected in sediments (Shen et al., 2011). Even though the number of studies is still small, additional data collected in Korea, Brazil, North Africa, Spain and Germany (de la Torre et al., 2012; de la Torre et al., 2011; Kang et al., 2010; Munoz-Arnanz et al., 2012; Sühling et al., 2013) indicate that DP and related compounds should be considered as possible worldwide contaminants.

Two recent review papers described sources, occurrence and behavior of dechloranes in the environment, concluding on the need of more research dedicated to the production of data on exposure and toxicity (Sverko et al., 2011; Xian et al., 2011). Additionally to the fact of considering environmental contamination and geographical distribution, a better understanding of the behavior of DP and related compounds in terms of bioaccumulation and biomagnification is still needed. Even more importantly, virtually no biological monitoring (biomonitoring) data are available for any of the dechloranes.

The present study had two main objectives. The first was to develop an analytical procedure to isolate and measure levels of DP, Dec 602, Dec 603, Dec 604, and CP. The second was to measure levels of these compounds in human serum samples in a selected part of the Western Europe population and compare them to PBDE levels to estimate the significance of dechlorane levels.

As dechlorane levels appeared to be comparable to PBDE levels, it is now important to further investigate what the route of exposure are and if our food web has to be monitored for such emerging compounds.

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