Multi residue analysis of 14 triarylmethane and phenothiazine dyes in aquaculture products by UPLC-MS/MS

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A multi residue method was developed for the simultaneous determination of possible alternatives for malachite green in aquaculture is presented. These dyes could also have concern to possible toxicological properties. Moreover, several of these dyes are free commercially available in local pet shops. A previously developed and validated method for malachite green, leucomalachte green, crystal violet, leucocrystal violet and brilliant green was extended with additional triarylmethane and phenothiazine dyes. Since the leuco-bases of all compounds are not commercially available, an oxidation step with 2,3-dichloro-5,6-dicyano-1,4-benzoquinone was incorporated. High differences in pKa values hamper the straightforward method development. Phenothiazine dyes are strongly retained on the strong cation exchanger cartridge. The highly basic sulphur (pKa<1) makes an almost positively charged compound which is responsible for the strong interaction. Since there is a trend to develop less pollutant extraction procedures, special attention was paid to avoid chlorine containing solvents. To investigate the possible illegal usage of these dyes, fish from different origins will be analyzed in the near future.