Modelling synergistic effects of Pb and Pyrene on the toxicokinetic and biochemistry of the marine polychaete *Hediste diversicolor*

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**Introduction**

Within marine sediment, contamination may exist as complex mixtures of chemicals including both metals and polycyclic - aromatic hydrocarbons (PAH's). Consequently, it is important to understand the assimilation and biological effects these chemicals may exert upon benthic marine species [2] such as the marine polychaete *Hediste diversicolor*. The aims of this study: Determine the assimilation and excretion rates of individual concentrations and mixtures of Pb and Pyrene by *Hediste diversicolor*, identify metabolism of pyrene to its phase 1 product - 1-hydroxypyrene.

**Experiment**

66 *Hediste diversicolor* were placed into tanks containing 6Kg of spiked sediment and artificial sea water (15ppt) for 28 days. The conditions assessed: Pb 9.2 ppm, Pb 4.5 ppm, Pb 9.2 + Pyrene 970 ug/kg, Pb 4.5 ppm + Pyrene 480 ug/kg. Worms were removed for analysis every 7 days. Remaining worms were removed after 28 days then placed into tanks which contained clean sediment for a further 28 days. Worms were removed for analysis every 7 days.

**Results**

• Worm whole body concentrations from those exposed to Pb9.2 ppm were significantly higher ($F = 13.8$, $p = <0.05$) than those exposed to Pb9.2ppm and Pyrene 970 ug/kg.

• Worm whole body concentration from those exposed to Pb4.5 ppm were significantly higher ($F = 38.98$, $p = <0.05$) than those exposed to Pb4.5ppm and Pyrene 480 ug/kg.

• Pyrene was metabolised to its phase 1 product 1-Hydroxypyrene within 1-14 days.

• 1-Hydroxypyrene was excreted by day 14 in clean sediment conditions for both test series.

**Conclusions**

• Whole body worm concentrations for Pb were significantly higher for worms exposed to Pb than those exposed to Pb + Pyrene mixtures.

• Pyrene body concentrations were metabolised to the phase 1 product 1-Hydroxypyrene within 1-14 days.

• 1-Hydroxypyrene was excreted by day 14 in clean sediment conditions for both test series.

**Future Work**

• Model the bioaccumulation and excretion dynamics of Pb and Pb + Pyrene mixtures on *Hediste diversicolor*

• Analyse detoxification mechanisms in *Hediste diversicolor* associated to Pb and Pyrene exposure including reactive oxygen species

**References**
