

ADSORPTION AND PARTITIONING BEHAVIOUR OF SELECTED TRACE POLYCYCLIC
SYNTHETIC MUSKS IN A SUSPENDED GROWTH AEROBIC
ACTIVATED SLUDGE SYSTEM

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ABSTRACT

This thesis investigated the influence of sludge retention time (SRT) and temperature (T) on selected activated sludge properties and their influence on partitioning and sorption behaviour of selected trace polycyclic synthetic musks (PSMs) of environmental concern.

Suspended growth aerobic activated sludge systems under controlled temperature (10 and 20 °C) and SRTs (3.5 and 10.5 days) conditions fed by municipal sewage were investigated. The selected PSMs monitored included Cashmeran, Celestolide, Phantolide, Traseolide, Galaxolide and Tonalide.

Activated sludge floc properties including relative hydrophobicity (RH) and extracellular polymeric substances (EPS) showed significant differences which correlated well (r_p of ± 0.5 to ± 0.8) with the removal of PSMs from the aqueous phase and associated with activated sludge. Galaxolide and Tonalide were found to represent over 95% of the total PSMs in both the aqueous and solid phases. PSMs aqueous reduction from 62 to 80 % was observed. The total PSMs associated with sludge ranged from 15 to 27 $\mu\text{g/g d.m.}$ and the lowest concentration was observed under 10.5 days SRT and 20 °C which also corresponded to nitrifying conditions. SRT was the dominant operational factor, followed by T and TxSRT which influenced floc properties and the partitioning of the PSMs.

The Freundlich equilibrium PSMs sorption and desorption isotherms, for sludges from reactors operated at 3.5 and 10.5 days SRT were generated and showed significant differences in sorption behaviour.