

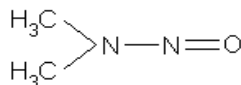
Research into emerging water quality issues and novel treatment technologies

Dr Michael Templeton and Prof Nigel Graham

Department of Civil and Environmental Engineering, Imperial College London

Disinfection By-Products in Drinking Water

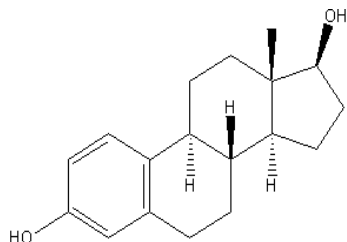
- Disinfection by-products (DBPs) result from the reaction of chemical disinfectants (e.g. chlorine) with natural organic matter (e.g. humic acids, fulvic acids)
- DBPs can be toxic to humans and some are regulated by law (i.e. there are limits on DBP concentrations in treated water)
- Current research at Imperial College is investigating two classes of DBPs that are not yet regulated in the UK – the haloacetic acids (HAAs) and nitrosamines (e.g. NDMA)
- The research includes partnership with UK water companies to measure DBPs in distribution systems
- The research examines fundamental DBP formation mechanisms and seeks to develop practical engineering solutions to minimise DBP formation



N-nitrosodimethylamine (NDMA) is a newly identified toxic disinfection by-product compound.

Endocrine Disruptors in Water and Wastewater

- Endocrine disrupting compounds (EDCs) enter the water cycle from anthropogenic sources (e.g. pharmaceuticals, pesticides, hormones) and are not well removed by conventional treatment processes
- Recent research at Imperial College investigated the destruction of commonly detected EDCs, such as octylphenol, nonylphenol, and di-n-butyl phthalate, by advanced ozonation and UV photolysis processes



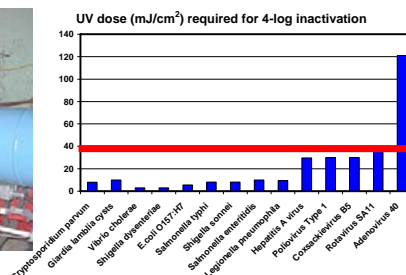
Estradiol from birth control tablets is not effectively removed by conventional wastewater treatment processes.

Ultraviolet Disinfection of Drinking Water and Wastewater

- Ultraviolet (UV) disinfection is an alternative to chemical disinfection in drinking water and wastewater treatment
- UV disinfection inactivates chlorine-resistant pathogens (e.g. *Cryptosporidium*) and forms little or no harmful disinfection by-product compounds
- Current research at Imperial College investigates UV dose-response kinetics for various types of opportunistic pathogens
- Recent research considered the impacts of water quality (e.g. turbidity) on UV disinfection performance



(Courtesy of Trojan Technologies)



UV doses required for pathogen inactivation. The red line indicates a typical minimum design dose.

Other Areas of Ongoing Research

- Water quality sensors for real-time monitoring of distribution system parameters
- Ozone-based treatment processes
- Computational modelling of water treatment and distribution (e.g. CFD, neural networks, EPANET)
- Novel coagulants and electro-coagulation
- Granular activated carbon (GAC)
- Slow sand filtration
- Water supply/management in developing countries

Find out more...



Contact: m.templeton@imperial.ac.uk or n.graham@imperial.ac.uk