World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:11, No:09, 2017

Removal of Problematic Organic Compounds from Water and Wastewater Using the Arvia™ Process

Authors : Akmez Nabeerasool, Michaelis Massaros, Nigel Brown, David Sanderson, David Parocki, Charlotte Thompson, Mike Lodge, Mikael Khan

Abstract : The provision of clean and safe drinking water is of paramount importance and is a basic human need. Water scarcity coupled with tightening of regulations and the inability of current treatment technologies to deal with emerging contaminants and Pharmaceuticals and personal care products means that alternative treatment technologies that are viable and cost effective are required in order to meet demand and regulations for clean water supplies. Logistically, the application of water treatment in rural areas presents unique challenges due to the decentralisation of abstraction points arising from low population density and the resultant lack of infrastructure as well as the need to treat water at the site of use. This makes it costly to centralise treatment facilities and hence provide potable water direct to the consumer. Furthermore, across the UK there are segments of the population that rely on a private water supply which means that the owner or user(s) of these supplies, which can serve one household to hundreds, are responsible for the maintenance. The treatment of these private water supply falls on the private owners, and it is imperative that a chemical free technological solution that can operate unattended and does not produce any waste is employed. Arvia's patented advanced oxidation technology combines the advantages of adsorption and electrochemical regeneration within a single unit; the Organics Destruction Cell (ODC). The ODC uniquely uses a combination of adsorption and electrochemical regeneration to destroy organics. Key to this innovative process is an alternative approach to adsorption. The conventional approach is to use high capacity adsorbents (e.g. activated carbons with high porosities and surface areas) that are excellent adsorbents, but require complex and costly regeneration. Arvia's technology uses a patent protected adsorbent, Nyex™, which is a non-porous, highly conductive, graphite based adsorbent material that enables it to act as both the adsorbent and as a 3D electrode. Adsorbed organics are oxidised and the surface of the Nyex™ is regenerated in-situ for further adsorption without interruption or replacement. Treated water flows from the bottom of the cell where it can either be re-used or safely discharged. Arvia™ Technology Ltd. has trialled the application of its tertiary water treatment technology in treating reservoir water abstracted near Glasgow, Scotland, with promising results. Several other pilot plants have also been successfully deployed at various locations in the UK showing the suitability and effectiveness of the technology in removing recalcitrant organics (including pharmaceuticals, steroids and hormones), COD and colour.

Keywords : Arvia™ process, adsorption, water treatment, electrochemical oxidation
Conference Title : ICWTTWP 2017 : International Conference on Water Treatment Technologies and Water Pollution
Conference Location : Zurich, Switzerland
Conference Dates : September 15-16, 2017