



Contribution ID: 87

Type: Oral

Ionizing Irradiation-Induced Degradation of PPCPs in Aqueous Solution

Tuesday, 25 April 2017 09:20 (20 minutes)

Pharmaceutical and personal care products (PPCPs), especially the pharmaceutically active compounds (PhACs) such as antibiotics and hormones have attracted great concerns worldwide for their persistence and potential threat to ecosystem and public health. PPCPs are being increasingly detected only recently and considered as potential hazardous to ecosystem owing to the rapid development of analytical techniques which enable to quantify PPCPs at trace level and investigate their fate and transformation pathways.

Ionizing irradiation is a promising alternative for degradation of PPCPs in aqueous solution. The studies reviewed have demonstrated that ionizing irradiation was effective to degrade a wide range of PPCPs in aqueous solution. Many PPCPs such as antibiotics and X-ray contrast agent could be removed completely by radiation. Solution pH is a key factor to affect PPCPs degradation. However, high doses are needed for mineralization and toxicity reduction. Development of the combined processes of ionizing irradiation with other techniques such as H₂O₂ and ozonation would be a solution to increase the rate of mineralization and reduce the cost. In most cases, •OH radicals are the major reactive species responsible for degradation of PPCPs by irradiation. Identification of the intermediates and end products, addition of a radical scavenger and the application of pulse radiolysis technique are the most tested methodologies to explore the reaction mechanism of radiation-induced degradation and optimize the degradation efficiency.

The majority of studies on PPCPs removal using ionizing irradiation have been orientated towards the treatment performance and effects of operational parameters in pure water solution. Moreover, high concentrations of PPCPs were used in most studies for detecting those compounds easily, which can only reflect some situations such as the treatment of industrial pharmaceutical effluent and are far from the real situation in water matrix. From a practical point of view, studies on the decontamination and disinfection of the real effluent or water containing PPCPs by ionizing irradiation should be paid more attention and the transformation byproducts are of concern owing to their potential stability and toxicity. The bioluminescence inhibition assay with *Vibrio fischeri* has been used to evaluate the toxicological effect of PPCPs in aqueous solution after ionizing irradiation. Research on the toxic evaluation of parent compounds and their degradation byproducts using a variety of methods are needed in future studies.

Country/Organization invited to participate

China

Primary author: Mr WANG, Jianlong (Tsinghua University, China)

Co-author: Ms CHU, Libing (Tsinghua University, China)

Presenter: Mr WANG, Jianlong (Tsinghua University, China)

Session Classification: A04

