Atti del
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della Società Chimica Italiana

1973-2023 – I primi 50 anni della Divisione di Chimica Analitica

Palazzo D'Avalos, Città del Vasto (CH)

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CONTINUOUS PHOTOCATALYTIC SYSTEM FOR WATER REMEDIATION: A LAB-SCALE PROTOTYPE

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In the last years a large number of new contaminants have affected the quality of both superficial and underground water around the globe. The presence of these pollutants it's difficult to evaluate due to their low concentration and the complexity of detection. The growing attention to emerging contaminants (EC) is leading to a change in the water quality and aquatic environment definition, which must increasingly respond to assessments of the protection of human health and the environment. The increase in the human life expectancy coupled with the rise in population increased the use of pharmaceuticals, and thus, intensify the presence of antibiotics, analgesics, anti-inflammatory, antihistaminic, antiepileptic, and other type of drugs in aquatic environments: a long list that is continuously updated. Unfortunately, today's WWTPs are unable to effectively remove these compounds and therefore many pharmaceuticals end up in aquatic ecosystems, inducing problems such as toxicity and antibiotic resistance. Therefore, it is important to study and develop new strategies and innovative technologies for water remediation. A possible approach for polluted waters remediation has been demonstrated to be the use of advanced oxidation processes (AOP)[1]. AOPs are based on the ability to photoproduce species of free radicals, such as ($^{\cdot}OH$), which being a strong oxidant characterized by an oxidation potential equal to $E° = +2.1$ V vs. NHE allows the oxidation of a variety of organic substances leading to their mineralization. In this work, a laboratory-scale plant for the remediation of pharmaceuticals-contaminated water was employed. The photodegradation studies were initially conducted using the batch method, and then moved on to the continuous system. The photocatalyst used was WO_3; in the continuous system the catalyst was immobilized on the surface of the glass spheres. LC/MS analysis was performed to evaluate degradation kinetics, by-product formation and to assess the degradation pathway.

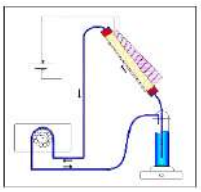

Figure 1. Continuous photocatalytic system

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