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Supercritical Water Technology Applied to the Purification of Waters Contaminated by Toxic Micro-Polluting Organic Compounds

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ABSTRACT

Purification of water contaminated by toxic organic compounds at low and very low concentration is a quite interesting challenge from both the technical and the economical point of view. In fact, the direct destruction of organic compounds dissolved in very diluted aqueous solution is very costly and hardly achievable. To overcome this problems it was studied and developed a new water purification process which is made of three steps: a) removal of the diluted and toxic polluting compounds by adsorption on activated carbon beds operating at ambient P ant T; b) regeneration of the exhausted carbon bed with supercritical water in order to obtain a mixture of water and polluting compounds signifi-cantly more concentrated than the contaminated liquid water; c) destruction of the toxic compounds in a continuous Supercritical Water Oxidation Reactor. Step a) was studied at laboratory scale in order to obtain all the required information for modeling the adsorption operation; step b) was modeled by using literature experimental data and, step c) was validated at pilot plant scale. In all the above mentioned steps, phenol was used as representative of polluting compounds.

KEYWORDS

Supercritical Water Oxidation; Water Purification Process; Solid-Liquid Adsorption; Gas-Solid Regeneration

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