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Radiotracers for Pulp Flow Dynamics Study in Three Different Phosphoric Acid Reactors

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Radiotracers are the method of choice to diagnose the functioning of the chemical reactors providing the most important parameters of the flow hydrodynamic and homogenization. It is known that radiotracers are the most sensitive and accurate techniques for online measurements of process parameters in industrial chemical reactors. Thus three different chemical reactors for the production of phosphoric acid in Tunisian phosphate processing plant were diagnosed by applying radiotracer method. The diagnosis of these reactors hydrodynamic behaviors was requested to evaluate the necessary parameters for assessment of the current performance and for planning further action to improve their efficiency.

Tracer tests were carried out under production condition using ^{131}I (Na^{131}I in powder form). The radiotracer was solved in some 0.5 l water and was injected at the entrance of the reactor inside the central unit. The injection was performed instantaneously (as Dirac pulse). Two scintillation probes (2" x 2") were placed looking at the exit pipe from reactor. Both gamma detectors were well collimated with lead shield to reduce the influence of background radiation. The measuring time was fixed 10s in order to detect fast movements inside and outside the reactors, in particular to measure the flow rate of the internal recirculation inside the reactor. The experiment allowed determination of the experimental RTD curves, the MRT, the flow rate of internal recirculation, the coefficient of internal recirculation, the dead volume rate, and identification of the mixing model corresponding to the whole reactor system operation.

Country/Organization invited to participate

Tunisia

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