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**Water purification by a new hybrid plasma- sensitization-coagulation process**

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**Abstract**

In this work, the cold plasma in humid air generated by gliding arc discharge was combined with the coagulation to remove the AG25 dye from water. The coagulation was initiated by the plasma process to improve the pollutant removal. This initiation consists in the sensitizing (exciting) of the AG25 molecules by their treatment during relatively a short time compared to the times conventionally adequate in water treatment processes especially by GAD. The plasma-sensitization is an original approach whose the applications can be extended to other wastewater treatment processes.

A total removal of the dye was obtained in 20 min by a conventional coagulation in the presence of (FeCl<sub>3</sub>, 6 H<sub>2</sub>O) salt. The plasma-sensitization during 30 s led to the same result in 10 min only. To investigate experimentally the plasma-sensitization approach, a number of physico-chemical analyses were made on the aqueous solution and the produced sludge. The results showed a good synergy between the plasma-sensitization and the coagulation processes: (i) the zeta potential becomes zero more rapidly for the sensitized samples than those directly coagulated; (ii) The FT-IR analyses have indicated that the sensitization gives a better migration of the AG25 molecules to the ferric salt as well as a good physical cohesion of the sludge compared to un-sensitized samples; (iii) the iron mass balance indicates that the migration of the AG25 molecules is more efficient for the hybrid process than for the

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