Poster E14

Waste Water Treatment by Coupling Wet Air Oxidation and Biofilter Processes

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Liquid wastes, from domestic or industrial origin, represent important volumes to be treated. Beyond this quantitative aspect, the effluent is also increasingly complex, due to the presence of molecules difficult to degrade. To limit their impact on environment, it is important to optimize their degradation by increasing the effectiveness of treatment. It could be interesting to combine two processes becoming complementary in terms of efficiency and enable to degrade compounds in order to achieve significant levels of overall degradation while minimizing energy expenditure related to treatment. One approach is the coupling of wet air oxidation and biofiltration.

Typical effluents are those with a high organic load, the presence of phenolic compounds as well as some nitrogen molecules. Some of these molecules are easily removed with wet air oxidation process and other after a biological treatment. Concerning wet air oxidation, few works have been dedicated to these effluents. The main works have been conducted under catalytic wet air oxidation [1] [2]. In [1] they also have tested the biodegradability of the effluent after wet air oxidation.

Different effluents are degraded through different experimental conditions in wet air oxidation (between 5 and 25 MPa and between 150 and 300°C), the resulting effluent is analysed through its main components (benzoquinone, hydroquinone, acetic acids ...). Then biodegradability tests are conducted in a fixed bed biofilm reactor under different hydraulic conditions to enhance either carbon or nitrogen removal. At least, COD and NT analysis of the effluent are carried out to determine the efficiency of the processes. The results allow drawing a map of different degradation yield taking into account the different conditions tested, with the different degradation mechanisms. Next step will be to use these results in process simulation software in order to determine the best combination of the process, taking into account the overall degradation rate as well as the energetic cost. These two results are important to assess the viability of process coupling.

References

[1] MINH et al., Applied Catalysis B: Environmental, Vol. 84, **2009**, p.749

[2] GOMES et al., Catalysis Today, Vol. 124, **2007**, p.254