C.18. ADVANCEMENT IN MODELING AND MATHEMATICAL OPTIMIZATION OF AN ADSORPTION-BASED TREATMENT PROCESS

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Abstract. Nowaday, Nowaday, for removal of dissolved substances from waters and wastewaters, the *biological conversion* and certain *physical-chemical processes* are always in use. A special attention is accorded to *adsorption*, especially to the adsorption onto ‚low cost' adsorbent which is considered as an emerging wastewater treatment technology.The models for the adsorption-based treatment of various wastewaters can be *mechanistic* (*i.e.* adsorption isotherms, kinetic models, thermodynamic design) or *empirical* (*i.e.* relationships between experimental data and graphical representations or sorption capacity or treatment efficiency) equations, revealing the complexity of adsorption processes. In the present work, some modeling and optimization data designed for one-single adsorption treatment step of a textile wastewater onto 'low cost' adsorbents (pine sawdust, coal ash, peat) are described using an empirical active central compositional rotatable design of 2^3 or 2^4 order and also some *mechanistic models* (i.e. corresponding adsorption isotherm models, kinetic adsorption

models in static or dynamic regime, thermodynamic design). In all experimental findings, the batch‘ adsorptive treatment onto natural or industrial ‚low cost‘ wasted materials applied for the textile wastewater represents a viable alternative for removal of polluting species. The proposed models were found adequate for the adsorption-based treatment of studied textile wastewater, and the optimal operational conditions for highest treatment efficiency were proposed for each type of tested absorbent for reducing of polluting load of textile wastewater.

Keywords: adsorption isotherm, advanced textile wastewater treatment, experimental planning, kinetic and thermodynamic issues, mathematical optimization, mechanistic and empiric models, treatment degree.