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Research area: General aims

Environmental technology // Water

Keywords:

Residual COD, deinking mills

Subject:

Chemical and process parameter based forecast of organic loads in the inflow and outflow of effluent treatment plants in deinking mills

Initial situation / Problem area:

The effluent loads of deinking paper mills producing recycled-fibre based newsprint, household and sanitary papers amount to between 13 and 22 kg COD/t paper. After biological treatment, the residual COD loads are in the range between 2.3 and 6.4 kg/t. The COD load of deinking mill effluents is reduced by 75% - 85% by biological treatment, whereas the COD reduction of other paper mill effluents reaches 90 % or more.

The causes of these differences in effluent loads and biological treatment efficiencies have not yet been fully identified. This leads to relatively high error rates of load forecasts based on present knowledge. As a result, the construction or reconstruction of paper mills and effluent treatment plants involves high planning risks.

Objectives / Research results:

Improving the forecast of organic loads in the inflow and outflow of effluent treatment plants in deinking mills as a function of raw material properties and process parameters.

Providing reliable information for optimum plant design and deriving reasons and arguments for extended effluent treatment in paper mills with deinking plants.

Several paper mills with deinking plants, producing different kinds of products, were investigated. As influencing factors on the residual COD were identified the amounts of chemicals used (NaOH, hydrogen peroxide, sodium silicate, soap) and the quality of raw materials. Based on statistical methods (multiple regression) statistical models were created, which describe the influence of chemicals and raw material on residual COD. Caused by the multitude of influencing factors, which cannot be taken in account (variation of raw material properties, process parameters, efficiency of biological treatment process, retention time etc.) models show high variation coefficients, but the effects are significant. The results of the project show that the strongest influence on residual COD is caused by NaOH, the higher the used amount the higher the residual COD (1 kg/t NaOH creates 0,1 – 0,3 kg/t residual COD). Other technological factors e.g. pH, brightness or increase of brightness are not significant.

Application / Economic benefits:

The project results will allow for a more accurate planning or design of reconstruction and extension measures in paper mills with deinking plant, to avoid over-dimensioning and minimize investment costs. The reduction of residual COD loads can - at least in Germany - save effluent discharge fees. A further cost saving potential lies in the reduction of effluent treatment costs.

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Remarks:

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