9/2021

INSPEM'S ONLINE WEEKLY SEMINAR

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MEDIUM : VIDEO CONFERENCE (ZOOM)

Meeting ID: 960 1464 7762
Passcode: 788910

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Topic : Mathematical Models for Alkaline Pulp and Paper Properties of Oil Palm Empty Fruit Bunch Fibre (EFB)

ABSTRACT

The main purpose of alkaline pulping is to remove enough lignin among the fibres so that the latter can be readily separated from one another in producing a pulp. Pulping is a multivariable reaction process. The chemical reactions occurring in the wood matrix during alkaline pulping are complicated – carbohydrate is partly degraded and dissolved, extractives are removed largely, and the lignin is extensively degraded and dissolved. In a multivariable system, the effect of a single variable is not comparable unless all other conditions are fixed at the exact same condition, vies, a one-variable-at-a-time experiment. This approach is deficient because it does not elucidate the effect of each individual factor, and the interactions with different factors cannot be observed (Anderson & Whitcomb 2000). One technique particularly suited to this application is Response Surface Methodology (RSM), which merges the methods of planned and efficient experimental design with least squares modelling to identify optimum conditions for the process response.

The objectives of this study are to develop mathematical models for alkaline pulp and paper properties based on experimental data and to determine the optimum alkaline pulping parameters for a desired pulp and paper quality. In this study, the influence of four pulping variables: sulphidity, anthraquinone, cooking temperature and cooking time, on the pulp's yield, viscosity and kappa number; and paper's structural, mechanical, and optical properties of oil palm empty fruit bunches (EFB).

Response surface methodology was utilised to optimise the pulping process and a central composite design (CCD) was adopted. CCD involves outlining the composition of the experimental process conditions around a central combination and then subsequently used to develop the regression models.

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