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Research area:
Chemistry, process technology, microbiology

Key words:
Slime formation, biofilms, nitrate

Subject:
Possibilities and limitations of nitrate salts for controlling slime formation in paper water systems

Background / Problem area

About 75 % of all Bavarian paper manufacturers are small and medium enterprises. Compared to the average German paper mill, the Bavarian paper industry is famous for its high recovered paper utilisation rate whilst consuming comparably low amounts of fresh water (low specific effluent discharge). Consequently, slime formation in the wet end is one of the most serious microbial problems in papermaking, and has increased dramatically in recent years. The reasons for this increase are changes in process technology and the raw materials used, e.g. the introduction of neutral papermaking, replacement of aluminium sulphate and the increasing closure of water circuits in combination with growing utilisation rates of recovered papers. The increasing slime formation in water circuits is caused by the use of fibrous raw materials containing large amounts of contaminants and micro-organisms (recovered papers). This in turn leads to a faster accumulation of organic substances in the process water, to increased electrolyte and calcium concentrations, and to elevated higher process temperatures. State-of-the-art slime control concepts are based on the targeted use of biocides. The EU Biocide Directive (98/8/EG) implemented on 14th May 2000, however, demands an approval procedure for all biocide products. Even existing agents and products must pass an evaluation process relating to their environmental compatibility and performance in order to be able to be sold commercially. This is expected to incur extra costs of about 5m € per agent/product and approval procedure. As a result, about 50 - 65 % of the biocide products currently being used will disappear from the market. There is an urgent need for further research into slime formation and its impact, and for novel solutions in the area of slime control.

Objective / Research results

The project aims at replacing some biocides, well known for slime control in the paper manufacturing process, by environmentally sound nitrate salts.
Based on the findings gathered, the unsatisfactory know-how relating to slime control by biocide substitutes should be expanded, i.e.:

- environmental compatibility (environmentally sound nitrate salts)
- occupational safety (biocide substitutes; less sulphide formation)
- process relief (load reduction in water circuits; less corrosion potential)

Results:

- Workpackage I: “Characterisation of process water” successfully performed for one water
- Workpackage II: “Modifying /Optimising of pilot plant” successfully performed
- Meeting on 26th January organised by PTS at a Bavarian paper mill together with four suppliers to define specific workprogramme covering Workpackage III and IV

Application / Economic benefits

About 80% of the fresh water introduced into Bavarian paper mills originates from surface water. Consequently, increased organic carbon loads and microbiology are monitored. As a result, slime formation will be promoted, causing serve problems in terms of decreased process stability and product quality. This would also lower the number of complaints received on the grounds of inadequate product quality.

At the same time, great efforts are being undertaken to increase paper machine speed whilst reducing grammage and increasing the fraction of fillers. Guaranteeing competitiveness, this development presumes increased process stability which is based on improved slime formation control.

Project period: 1st August 2004 – 31st July 2006

Remarks

The BAY08/04 research project is being sponsored by the Bavarian Ministry of Economic Affairs, Transport a Technology.

Are you interested? Then send us this short description with your name and address via fax. The project manager will contact you afterwards.

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☐ **I want to participate in the project**

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