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Improving deposition tester to study adherent deposits in papermaking

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ABSTRACT

Conventional methods used for the quantification of adherent material contained in a pulp suspension propose either filtration of the sample, which may lead to loss of sticky material in the filtrate, or dilution of the pulp, which may cause destabilization of the dissolved and colloidal material; thus, leading to unreliable results. In 1998, the Cellulose and Paper Group of University Complutense of Madrid developed a deposition tester which aimed to quantify the adherence of material (microstickies and secondary stickies from dissolved and colloidal material) that was present in white waters generated during papermaking processes. In this paper, an improved deposition tester capable of directly studying the deposition tendency of total stickies in pulps without dilution is described and validated. The design of this device prevents the rotor system from being clogged and blocked by pulps, hence, being able to quantify deposits without having to apply any filtration and/or dilution stages. In addition, the study provides determination of the equipment optimum operating conditions as well as comparison between the improved deposition tester and the one previously developed. Results show that this deposition tester can determine the adherent material contained in pulps with a consistency up to 1%. The comparison of results obtained after applying both deposition quantification methods shows that the quantities of deposits that were measured with the improved tester are slightly lower than those obtained with the application of the conventional method; however, they are in the same order of magnitude. Therefore, it is possible for the improved tester to determine total stickies in all cases, including cases that it is not convenient to apply a filtration and/or a dilution stage.

Keywords: Stickies; Secondary stickies; Dissolved material; Colloidal material; Papermaking; Deposit problem

1. Introduction

As known, the use of recovered paper as raw material in papermaking has increased in the last years. This means that serious technical drawbacks may be introduced, especially drawbacks associated to high amounts of contaminants conveyed into the system by the recovered paper. These contaminants, together with the process chemicals used in the papermaking process, may lead to accumulation and destabilization of dissolved and colloidal material (DCM) that eventually forms deposits or stickies (Blanco et al., 2002a,b; Brun et al., 2007; Ricard and Dorris, 2007a,b). These deposits affect machine productivity, additive efficiency and product quality.

The composition of recovered paper is very heterogeneous and, therefore, the presence of contaminants in secondary fibre pulp is highly variable (Blanco et al., 1998b; Miranda et al., 2011). DCM, which is anionic, also known as anionic trash, is considered to be able to form potential deposits because, when destabilized, it can produce secondary stickies that may occur at any time in the machine, *i.e.*, during a physic–chemical shock. The most common destabilization mechanisms are electrostatic shocks, temperature shocks and evaporative destabilization (Doshi, 1997; Monte et al., 2010; Sundberg et al., 1993).

With respect to the paper industry, determination of the contaminants present in pulps and their potential ability to deposit, along with the conditions for their destabilization, are

Abbreviations: DCM, dissolved and colloidal material; DDJ, dynamic drainage jar; DIP, deinking pulp; *n*, size of the sample; PEI, polyethylene-imine; *t*, t-Student for confidence level of 95% and $(n-1)$ degrees of freedom.

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