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Ozone bleaching of South African Eucalyptus grandis kraft pulps containing high levels of hexenuronic acids

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Abstract

Ozone use in conjunction with chlorine dioxide during pulp bleaching offers several advantages over conventional bleaching sequences that make use of chlorine dioxide only. Despite this, in South Africa, only one mill uses ozone. The current study was a preliminary investigation into the use of ozone in bleaching sequences for kraft pulps produced from South African Eucalyptus grandis wood chips, which typically contained high amounts of hexenuronic acids (HexA). The objective of the study was to compare the performance of ozone to other technologies used to remove HexA, such as acid hydrolysis (A) and hot chlorine dioxide (DHT) stages. Bleaching sequences using chlorine dioxide (i.e. OAD0ED1D2 and ODHTED1D2) were compared to bleaching sequences using ozone (i.e. OZD0ED1 and OAZD0ED1). The results showed that ozone preferentially reacted with HexA in the presence of lignin. When applied after oxygen delignification, ozone had the same HexA removal efficiencies as the A- and DHT- stages at dosages in excess of 0.6%. When used in combination with the A-stage, the HexA removal efficiencies reached 96%. Consequently, up to 15% savings in the estimated bleaching chemical costs were achieved when OAZD0(EP)D sequence was compared to the standard reference sequence OAD0ED1D2. The residual HexA in the bleached pulp affected brightness reversion of the pulps, but this was only evident for the bleaching sequences that used chlorine dioxide, and not for those that included ozone.