

ABSTRACT

The Effects of Variable Composition on the Physical Properties and Calculated Processing Characteristics of Container Glass

Rosemarie Skeene

In the glass manufacturing process, variations in raw material composition and formulation can significantly affect the composition of the glass produced and, as a consequence, its processing characteristics. An indepth knowledge of these relationships is therefore crucial to the glass processor in effecting adequate process control. In response to a request from the local container glass manufacturer a programme of work was carried out in order to help the company improve its process control while at the same time minimising raw material costs.

The programme initially involved an extensive literature survey from which relevant relationships, as proposed by previous workers, were identified. These relationships were then tested experimentally, with those for density, liquidus temperature and softening point prediction being examined on a laboratory scale over commercial ranges of alkali and alkali earth contents. Samples from the production operation of the local container glass manufacturer were tested for their viscosity/temperature relationship.

The results obtained showed that :-

- (a) Predicted densities were more sensitive to composition changes than

measured changes.

(b) The relationship by Backman and Karlsson (1990) was that most appropriate for liquidus temperature prediction.

(c) The viscosity/temperature relationship is best predicted by the relationship proposed by Lakatos et al (1972).

A spreadsheet approach to the prediction of the relevant processing properties was proposed, which could be applied in such a way that predictions can be made from the raw material specifications and formulation. This approach would eliminate the high feed back time associated with the current method of glass quality control based on product sampling and testing.

Recommendations are made in respect of improving the technique for making small batches of glass, as well as improving the relationship proposed for predicting the liquidus temperature and the viscosity/temperature relationship.

Keywords: Rosemarie Skeene; Glass processing; Variations in glass raw material composition and formulation; Prediction of glass processing properties.