

THERMAL ANALYSIS LABORATORY

Objective: To use a differential scanning calorimeter (DSC) to characterize the thermally-induced transitions in pre- and post-processed cereal flours in relation to their thermal stability, processability and quality attributes.

Concepts: Laboratory practices, including DSC, designed to detect, monitor, and characterize the thermally-induced transitions including; melting, gelatinization, denaturation, and glass transition in biopolymers, specifically proteins and complex carbohydrates, and model synthetic polymers.

Materials:

- 1) Polystyrene, a synthetic amorphous polymer
- 2) Corn flour and the extrudates prepared from corn flour

Preparation of materials:

- 1) Polystyrene will be used as is.
- 2) Determine the moisture content of materials by freeze drying then run in DSC.
- 3) Add water to corn flour and corn extrudates to bring the moisture content to 70% then run in DSC.

Methods: TA Instruments DSC will be utilized for thermal analysis experiments.

Calculations:

Perform the data analysis to determine the temperature and the heat content of the transitions in your samples.

Report: You are expected to submit a report including the following specific points:

Title
Objective
Summary
Introduction
Theory and Analysis
Equipment
Materials and Method
Results

Discussion and Conclusions
References

Specific question: You are required to research the processing technique(es) that is (are) utilized to manufacture the various cereal products examined in the laboratory exercise.

Recommended literature:

Zeleznač, K.J. and Hosney, R.C. 1987 The glass transition in starch. *Cereal Chemistry*, 64(2): 121-124.

Kaletunç, G. and Breslauer, K.J. 1993. Glass transitions of extrudates: relationship with processing-induced fragmentation and end product attributes. *Cereal Chem.*, 70(5), 548-552.

Roos, Y.H. , Karel, M., and Kokini, J.L. 1996. Glass transitions in low moisture and frozen foods: Effects on Shelf Life and Quality. *Food Technology*, November, p. 95-108