

Measurements of Gelatinization of Starch by DSC

1. Introduction

As starch is heated with water, it loses its crystal form and becomes pasty. This phenomenon is called Gelatinization of starch and is an endothermic reaction, meaning that it can be measured with DSC.

DSC measurement allows the analyst to evaluate the difference among kinds of starch and determine the influence of heating rates and water content.

This brief measures examples of starch samples (from Wako Pure Chemical Industries) using hermetically sealed sample containers.

2. Methods and Data

DSC curves for gelatinization of corn starch, potato starch and wheat starch are shown in Figure 1. It is apparent that different profile patterns appear for each starch.

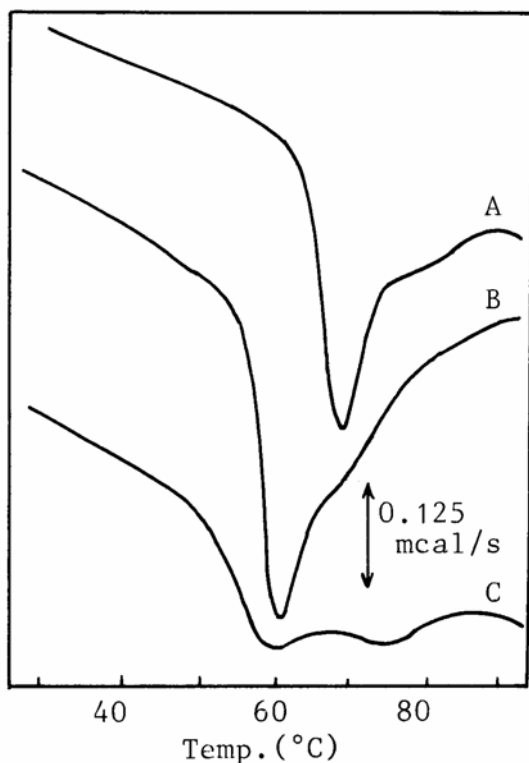


Figure 1 DSC curve of gelatinization of starch

Water content : 50%

Heating rate : 3°C/min

A : Corn starch

B : Potato starch

C : Wheat starch

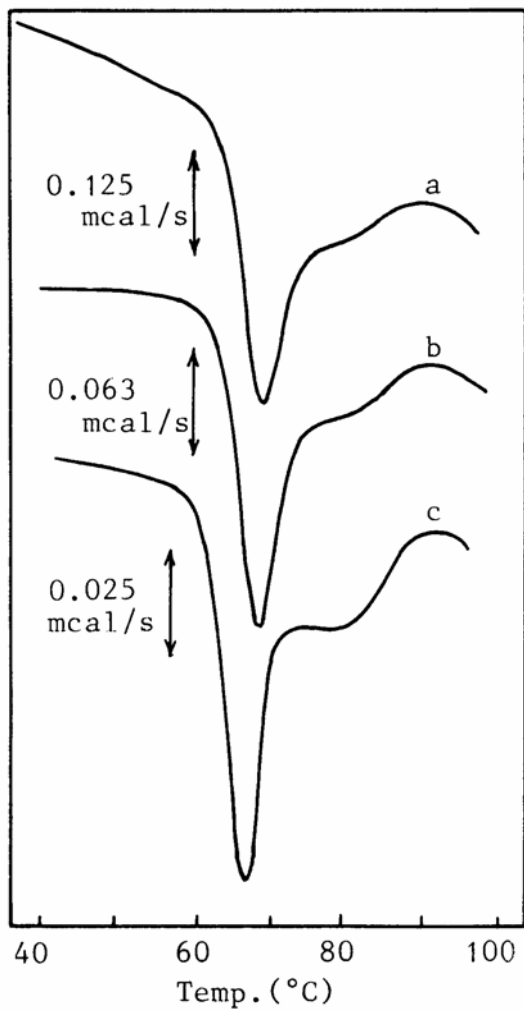


Figure 2 Heating Rate Dependence
 Sample : Corn Starch
 Water content : 50%
 a : 3°C/min
 b : 2°C/min
 c : 1°C/min

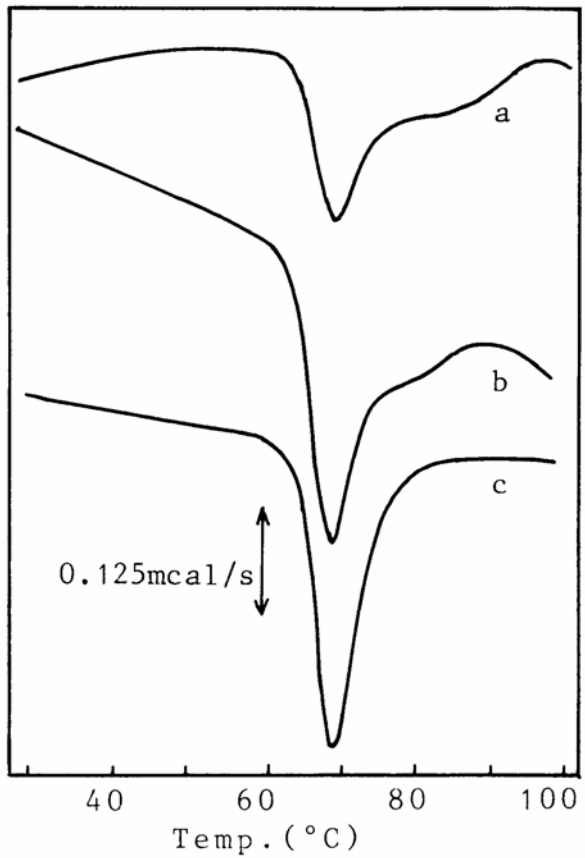


Figure 3 Water Content Dependence
 Sample : Corn Starch
 Heating rate : 3°C/min
 a : 43%
 b : 50%
 c : 60%

Figure 2 shows DSC profiles of corn starch obtained with differing heating rates. Figure 3 shows DSC profiles of corn starch obtained with differing water contents. The shoulder peak on the higher temperature side tends to disappear as the water content increases.

3. Conclusion

This brief demonstrates that hermetically sealed sample container DSC analysis is ideally suited for determination of starch characteristics and types, evaluation of process heating rates and determining the effects of differing water contents in starches.