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DSC Measurements for Mixtures of Oils and Fats

1. Introduction

One of the methods of identifying the presence of foreign fats in a particular fat or oil is the use of a differential scanning calorimeter. Using lard as a sample in which beef fat was added, this method was tested using a high sensitivity differential scanning calorimeter.

A number of methods are available for detecting the presence of foreign fats in a particular fat or oil (specially edible fats and oils), but recently methods utilizing a differential scanning calorimeter have been attracting attention¹⁾. The DSC curve for a mixture of fats or oils shows multiple exo- and endo- thermic phenomena. Therefore, in order to identify patterns in the DSC curve for these samples, the stability of the DSC base-line is extremely important. The reproducibility of peaks is also necessary for identification. In this report, an example of a DSC application for identification of the presence of foreign fats and oils is described using the DSC curve of a mixture of fats (lard and beef fat) taken with a Differential Scanning Calorimeter.

2. Methods and Data

Figures 1 and 2 show the solidification and melting thermograms of the sample. The mixture ratios of lard to beef fat are given in the table 1 for the 5 samples used.

Table 1 The mixture ratios of lard to beef fat

Sample	Lard	Beef fat
a	100%	0%
b	75%	25%
c	50%	50%
d	25%	75%
e	0%	100%

Both the solidification and melting patterns differ for different mixture ratios. In particular, changes in the solidification pattern corresponding to changes in the mixture ratio are quite evident. For example, the sharp exothermic peak observed for the sample with 100% lard decreases with increasing mixture ratio. It becomes almost invisible for the sample with 100% beef fat.

Figure 3 shows a plot of the peak height vs. the mixture ratio. Such figures can be used to measure the mixture ratio of a foreign fat in a particular fat and oil.

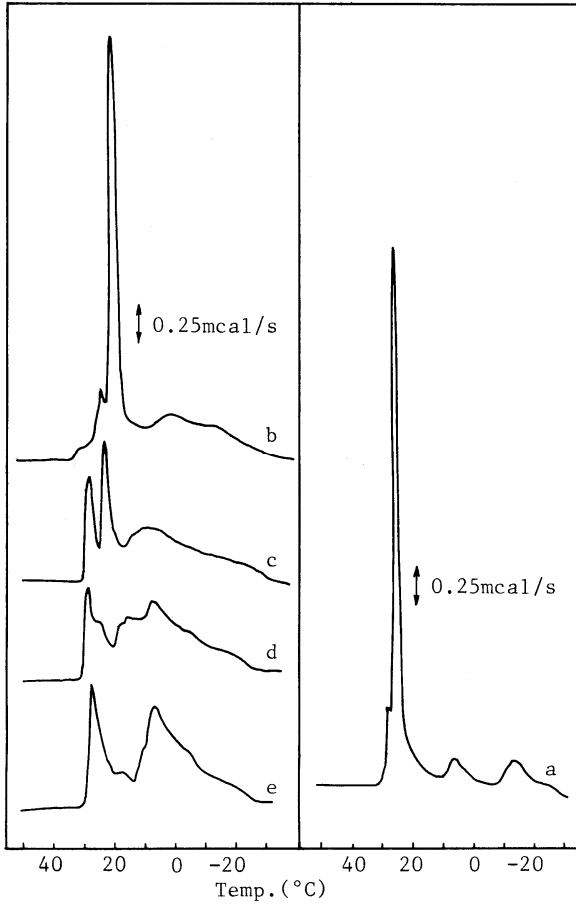


Figure 1 DSC Solidification Data
 Sample weight : 40mg
 Heating rate : 2°C/min

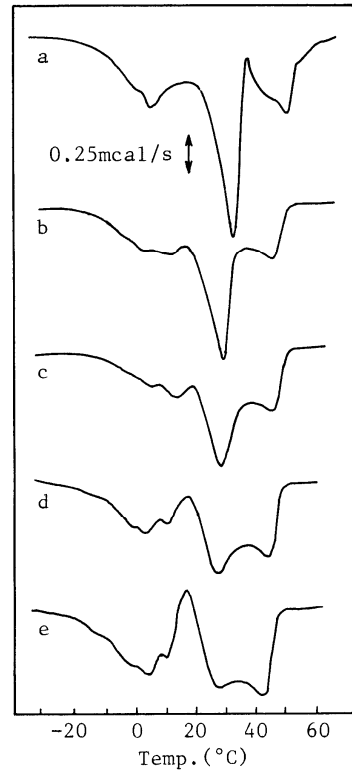


Figure 2 DSC Melting Data
 Sample weight : 40mg
 Heating rate : 2°C/min

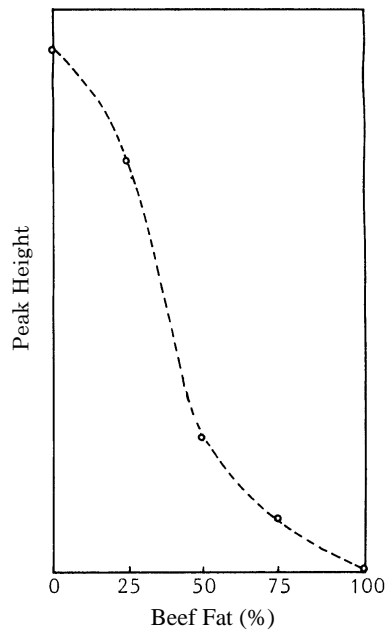


Figure 3 Peak Height / Mixture Correlation

References

- 1) I. Niiya, Netsu Sokutei (Calorimetry and Thermal Analysis), **15**, 84 (1978)