Chapter 5
Conclusion

Based on the results of this study, the following conclusions may be drawn

1. Thermal properties of mango fruits cv. Nam Dok Mai Si Thong at commercial maturity stage (as defines):

	Mango peel	Mango flesh
Specific heat (kJ/kg·K)	2.81±0.23	3.43±0.3
Thermal conductivity (W/m·K)	0.34±0.07	0.35±0.09
Density (kg/m^3)	1085.38±11.27	1036±13.57
Thermal diffusivity (m^2/s)	1.11×10^{-7}	9.85×10^{-8}

The thermal conductivity of this study lower than that of the others (Chusak, 1987; Chowdary, 1988 and Varith and Kiatsiriroat, 2004). This might be resulted from the procedure we used in determination, where the sample lost some moisture content in the DSC chamber.

The chemical composition of mango fruits cv. Nam Dok Mai Si Thong at commercial maturity stage were:

Composition (%)	Mango peel	Mango flesh
Moisture content	71.51	82.54
Protein	1.13	0.60
Fat	0.18	0.07
Ash	1.03	0.32
Carbohydrate	26.14	16.46

2. Based on the heat transfer theory, the variation of temperature within the fruit depends on the size, its thermal properties, and the convective heat transfer coefficient of the heating medium. To simulate the temperature history during thermal treatment of a mango, the basic heat transfer equation was developed under the following assumptions; the fruit was in cylindrical shape, its thermal properties were constant, and the heat transfer occurred only in radial direction. By using the thermal properties of the mango cv. Nam Dok Mai Si Thong at 25°C, the predicted temperatures were relatively closed to the experimental values. The root mean square error were 1.81 when the fruit were immersed in the hot water at 48±0.5°C. The difference between predicted and measured temperature less than 2°C could be accepted.

3. The experimental results indicated that the thermal properties, namely, thermal conductivity and diffusivity had increased by 21.2 and 18.0%, respectively for the mango being kept at 5°C for 5 days. The steady state was then followed until the storage period of 25 days was reached. This was compared with storage temperature at 13°C for 5 days with the increase in thermal conductivity and diffusivity of 6 and 1%, respectively. The rising trends were followed until the completion of 25 days storage period with the elevation of both thermal properties values by 27.3 and 22.0%, respectively. Similar results were observed for the mango

being maintained at 25°C. Investigation on the chemical and biochemical properties showed that the total titratable acid content, acidity, total soluble solid content and respiration rate of the chilled mango at 5°C were steady throughout the storage period. This was in contrary to the mangoes being stored at 13 and 25°C whose respiration rate and total soluble solid content increased during ripening process. Further confirmation could also be seen from the decrease in total titratable acid content. When the relationships between the thermal conductivity and diffusivisity together with the change of total soluble solid content were considered, the chilling injury symptom might be identified during the first five days if the thermal conductivity and diffusivity rose by more than 15% with constant level of total soluble solid content. This was differed from the mango underwent the process of ripening with the increase of total soluble solid content above 10°Brix while the thermal conductivity and diffusivity were elevated by less than 6%. Thus there is a possibility of using thermal conductivity and diffusivity as well as the total titratable acid content to monitor the chilling injury symptom of mango fruit which may be detected in the first five days of storage period.