Application Note TA6014

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TA6014 - Evaluation of chocolates

Introduction

When making a chocolate products, there are some original manufacturer's know-hows such as in crushing and refining etc., therefore, the flavor of chocolates become entirely different product, even if the same cacao crude material. The main processes are crushing, refining and preliminary crystallization, however, these processes involve temperature control frequently, thus, the ratio of each crystal form changes and the rank of food texture becomes different due to temperature transition.

For example of the evaluation of crystalline for the product in thermal analysis technique, DSC (differential scanning calorimeter) measurement is well known. In this present work, we evaluate two commercially available chocolates employing Thermomass for composition of the chocolate products.

Instrument: ThermoMass Photo

ThermoMass Photo is an evolved gas analytical system designed for real-time simultaneous measurements of thermogravimetry – differential thermal analysis (TG-DTA) coupled with electron impact ionization (EI) and the fragment-free photoionization (PI) mass spectrometry (MS) that performs measurements as a function of temperature or time.

Measurement and analysis

Mass spectra of 3D-graphics and around 410℃ for two commercially available chocolates employed EI and PI methods are shown in Figure2 1 and 2.

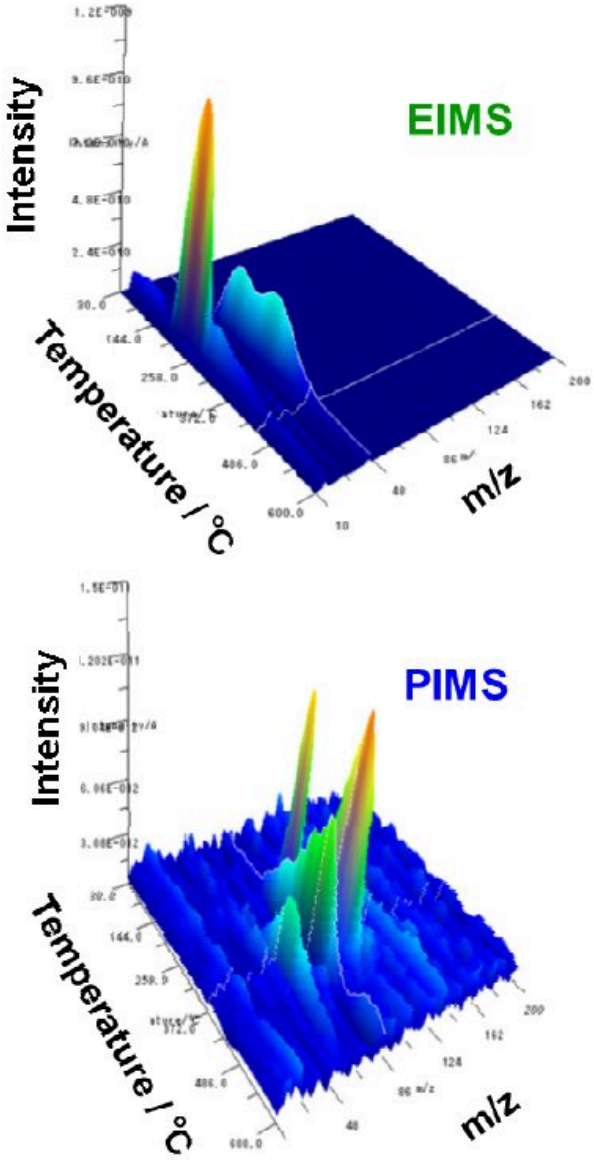

Figure 1(a): Mass spectra of 3D-graphic display of chocolate A employed EI method (top) and PI method (bottom)

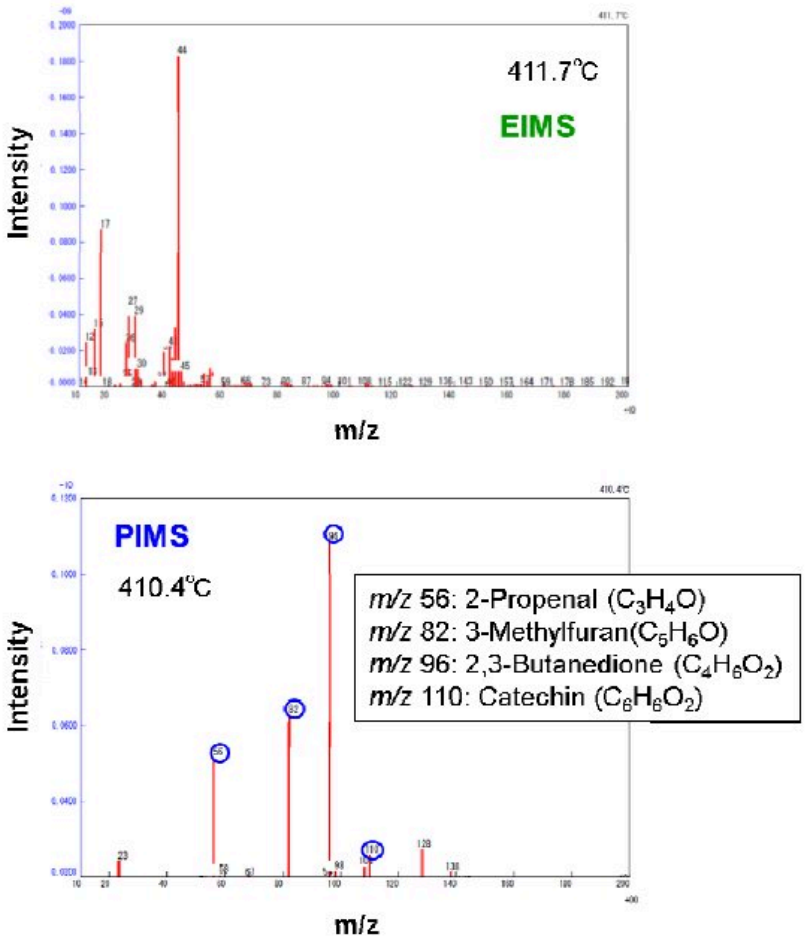

Figure 1(b): Mass spectra of chocolate A employed EI method (top) and PI method (bottom) at around 410℃.

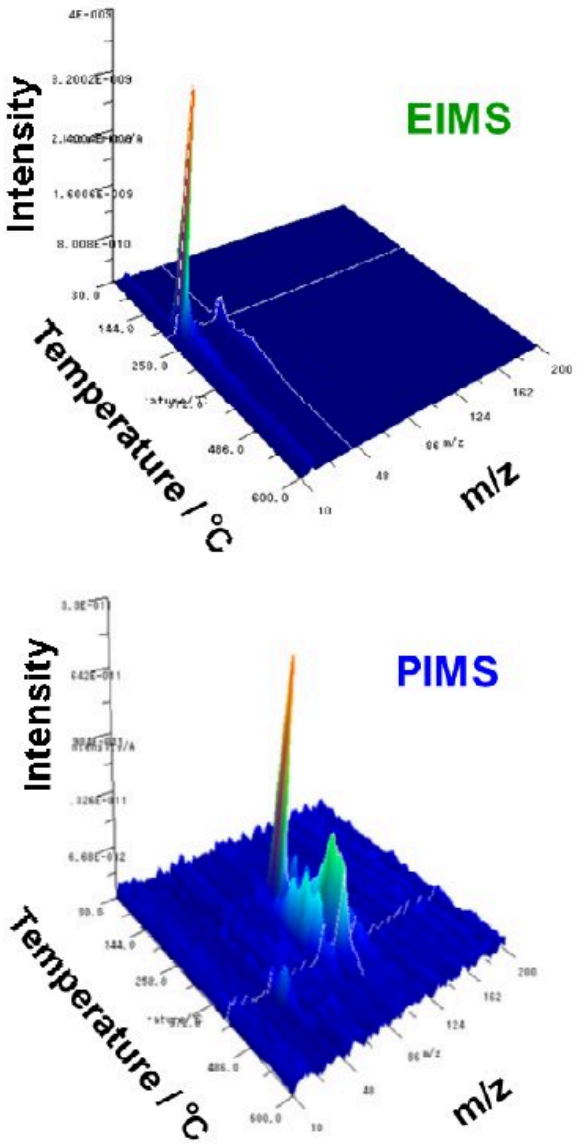

Figure 2(a): Mass spectra of 3D-graphic display of chocolate B employed EI method (top) and PI method (bottom)

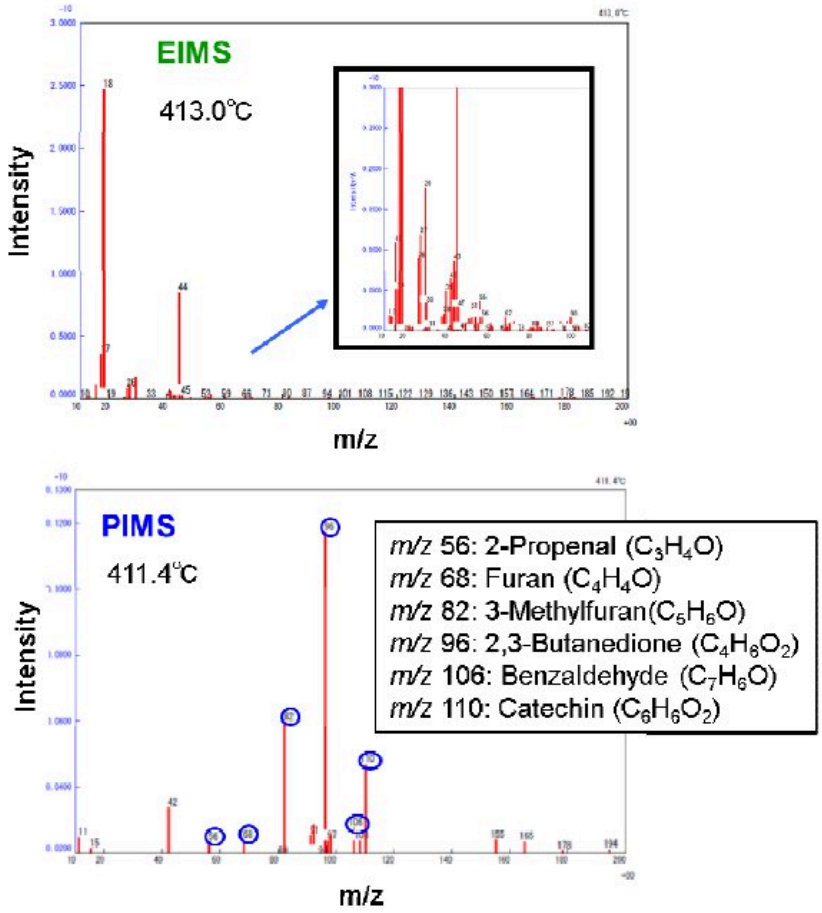

Figure 2(b): Mass spectra of chocolate B employed EI method (top) and PI method (bottom) at around 410℃.

A comparison between the results from EIMS and PIMS in each chocolate, the EI mass spectrum consisted of molecular ions along with numerous fragment ions formed by the high ionization energy of the EI. Since the detected fragmentation and molecular ions were mutually mixed, the identification of the evolved gas species was complicated and difficult. On the other hand, the PI mass spectrum shows that those evolved gas species were easily characterized.

A comparison between two chocolates in the PI method, the difference is observed clearly, thus, employing the ThermoMass, it is possibile to evaluate the compositions of chocolate products.

Related products

ThermoMass Photo

An integrated thermal analysis instrument capable of high-p
recision mass analysis of evolved gases without breaking t
he molecules, allowing direct measurement.