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# TA6012 - Evaluation amount of water in flour, drug and polymer

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## Introduction

The detection or analysis of the gases evolved during a chemical reaction, as a function of temperature, constitute the techniques of thermal analysis called evolved gas detection (EGD) and evolved gas analysis (EGA), respectively.

Thermal analysis using mass spectrometry covers a large number of related and analytical powerful techniques such as evolved gas analysis using mass spectrometry (EGA-MA) including thermogravimetry-mass spectrometry (TG-MS), temperature-programmed-pyrolysis-mass spectrometry and temperature-programmed desorption mass spectrometry.

In conventional EGA-MS, the evolved gaseous products, which are introduced rapidly to MS, are generally ionized by electron ionization (EI) at 70 eV. In this case, a part of the evolved gaseous molecular ion undergoes further decomposition, and observed simultaneously ions. Especially in the thermal processes, since the evolved gases consists of multiple gaseous species in almost all cases, the resulting fragment ions are overlapped, while the fragment ions provide significant information concerning the structure of the molecule, the apparent mass spectra can be quite complicated. In order to differentiate in real-time the multiple organic species that are evolved in the thermal process, one feasible approach is the use of MS with a selective and soft (fragment-free) ionization technique which avoids fragmentation during ionization.

Differential thermogravimetry photoionization mass spectrometer simultaneous measurement system (ThermoMass Photo) can detect the molecular ion without fragment, the system is applied the gaseous detector to photoionization mass spectrometer which coupled with TG-DTA-MS.

There are a lot of troubles when drug or polymer is absorbed of moisture more than requires, such as poor appearance, component change and deterioration of mechanical and physical property. Hence, it is important to know how amount of water is including in these samples.

In present work, we evaluated the amount of water in flour, drug and polymer employing ThermoMass Photo.

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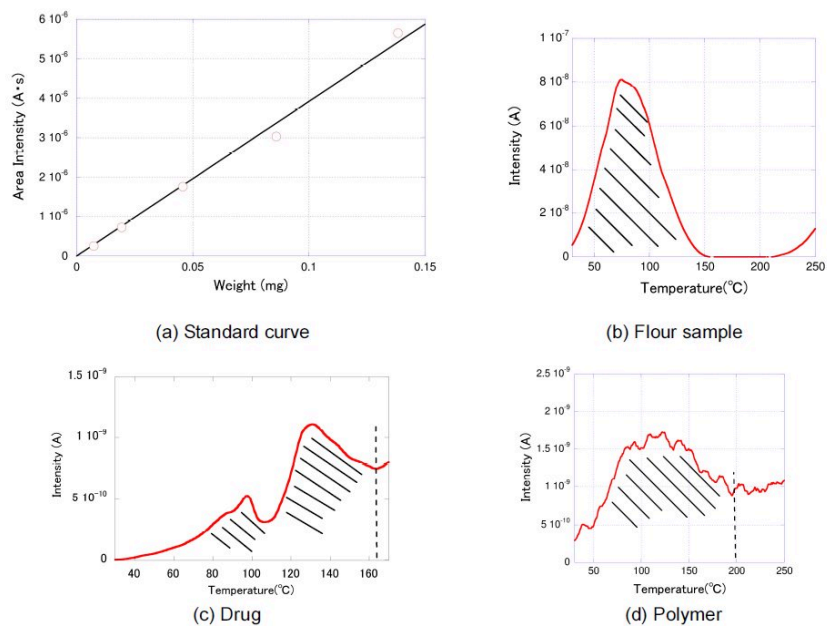
## Instrument: ThermoMass Photo

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

In actual procedure, we measure the standard sample of evolved water gas to make the standard curve at first, and then measure each sample to determine the quantity of water in sample. The standard curve and the quantity of water in sample measurement results are shown in Figure 1. These measurements show that flour, drug and polymer are 3.7wt%, 0.6wt% and 0.04wt%, respectively.

Thus, it is possible to determine the amount of water and at what temperature it was released from the sample when the sample is heated.



**Figure 1:** The standard curve of standard sample (a), and the measurement results of amount of water in flour (b), drug (c) and polymer (d), respectively

For flour, drug and polymer, these materials are commercial products

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## Related products



### ThermoMass Photo

An integrated thermal analysis instrument capable of high-precision mass analysis of evolved gases without breaking the molecules, allowing direct measurement.