Application Note B-TA1084

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B-TA1084 - Proximate Analysis of Coal： Quantification of Moisture, Ash, Volatile Matter, and Fixed Carbon

Introduction

ISO 17246 “Coal and coke — Proximate analysis” and JIS M 8812 “Proximate analysis of coal and coke” specify methods for determining the contents of moisture, ash, volatile matter, and fixed carbon in coal and coke.

For moisture determination, a method using a temperature-controlled drying oven and flat weighing bottles (loss on drying in air method) is described, while ash and volatile matter are determined using a temperature-controlled electric furnace and platinum crucibles.

In this application, STA was used to simulate the temperature conditions based on JIS or by referring to ISO 1015, ISO 1171, and ISO 562, and the quantification of moisture, ash, volatile matter, and fixed carbon was evaluated.

Measurement and analysis example

For moisture and ash content, approximately 26 mg of coal was placed in a Pt pan, and STA was performed at a heating rate of 20°C/min under air flow.

Moisture content was calculated from the mass loss after holding the temperature at 107°C for 60 minutes. Ash content was calculated from the mass loss after holding the temperature at 815°C until a constant value was reached. For volatile content measurement, approximately 26 mg of coal was placed in a Pt pan, and the temperature was held at 900°C at a heating rate of 20°C/min under N2 gas flow, and the mass loss at which the mass change became constant was determined.

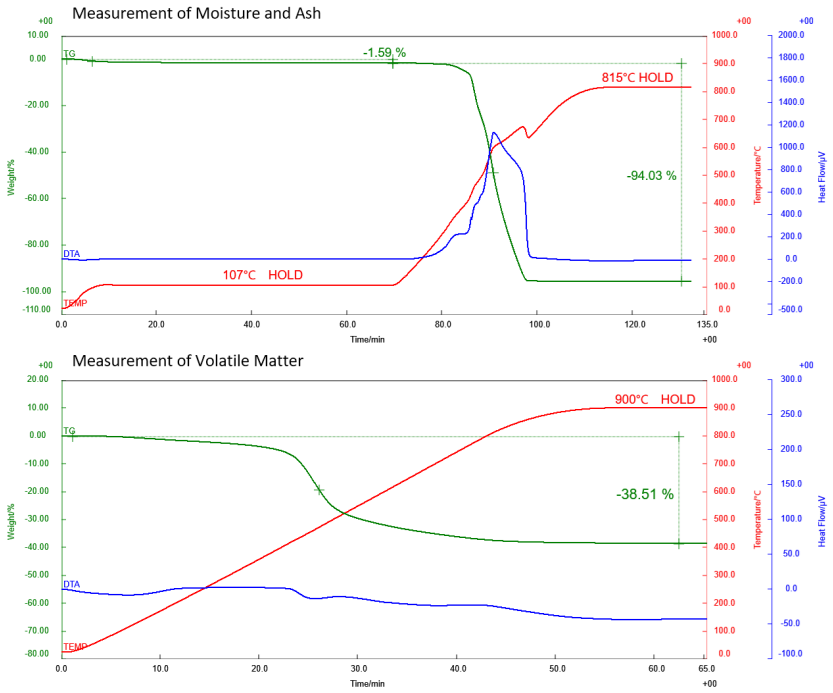

Figure 1: Measurement results of TG-DTA

From these results, the following content amounts were obtained:

- Moisture: 1.59 %, calculated from the mass loss after holding at 107 °C for 60 min
- Ash: 5.97 %, calculated by subtracting the mass loss of 94.03 % at 815 °C from 100 %
- Volatile matter: 36.92 %, calculated by subtracting the moisture content (1.59 %) from the mass loss of 38.51 % at 900 °C

The fixed carbon content was calculated as:

100 − (1.59 + 5.97 + 36.92) = 55.52 % These results indicate that TG-DTA provides a simple and effective complementary method to conventional ISO/JIS proximate analysis for evaluating the quality (grade) of coal samples.

References

- ISO 1015:1992 Hard coal — Determination of moisture in the analysis sample
- ISO 1171:2024 Coal and coke — Determination of ash
- ISO 562:2024 Hard coal and coke — Determination of volatile matter

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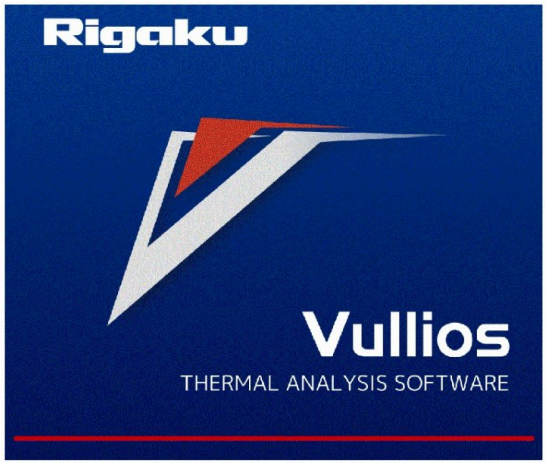

Vullios

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