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TA5006 - The difference of aging for material by thermal analysis

Introduction

Sometimes chemical or physical properties of a material change due to aging. Thermal analysis is useful for quality control or to determine if properties have changed by confirming the differences of properties with material aging.

Instrument: TG-DTA8121

The horizontal differential triple-coil balance system boasts a proven track record for mass-change measurements. It corrects or cancels various types of fluctuations that can be cause drifts. Combined with the newly developed electric circuits, it achieves low noise and excellent baseline stability.

Measurement and analysis

TG-DTA measurement result is shown Figure 1. At 400°C, the original sample, taken from a hermetically sealed state, shows a mass loss of -22.7% with endothermic peaks due to dehydration.

On the other hands at 400°C, the sample kept at 25°C, 60% RH condition for 7 days reveals a small amount of mass loss of -9.7% due to dehydration, and then the mass loss is observed -25.8% at 600°C. This indicates that keeping the sample at 25°C, 60% RH for 7 days allowed the sample to absorb CO_2 from the air and that a part of $\text{Ca}(\text{OH})_2$ changed to CaCO_3 . Thus, only a small amount of mass loss due to dehydration is observed at 400°C while the mass loss at 600°C is the result of CaCO_3 decarbonation.

Also, the measurement result of the original exhibits a slight mass loss of -1.3% at 600°C, which suggesting that carbonation progressed in the some parts of the sample during storage.

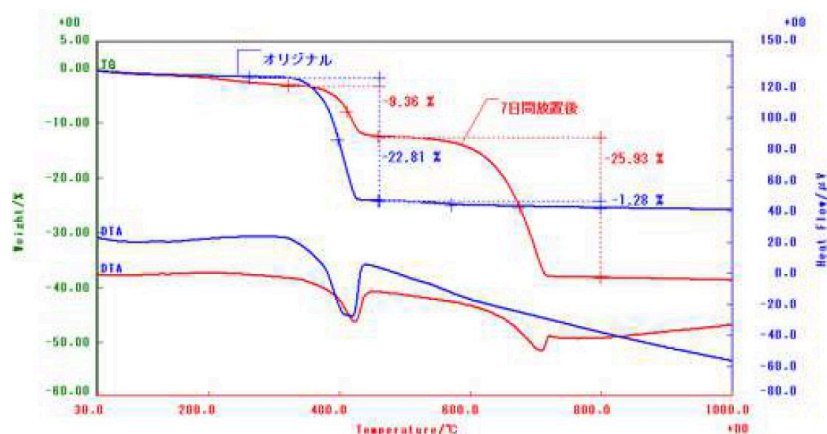


Figure 1: TG-DTA measurement result of original (blue line) and sample kept at 25°C, 60% RH condition for 7 days (red line) for $\text{Ca}(\text{OH})_2$.