Application Note B-TA2019

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TA2019 - TG-MS analysis of Apatite - 1

Introduction

Hydroxyapatite, a calcium phosphate mineral mainly found in bones and teeth, is attracting attention as a material that demonstrates high biocompatibility. Also, product development on optimizing its functionality such as ion exchange and absorbability is actively carried out. Here, we use theTG-MS method to analyze the thermal behavior of various hydroxyapatites produced in various methods.

Measurement and results

Three hydroxyapatite powders namely samples 1, 2 and 3 were used in this experiment. During measurement, 10mg of hydroxyapatite powder weighed in Pt pan was heated from RT~1400℃ at 20℃/min under He flow. The electron ionization (EI) method was performed for MS measurement.

Figure 1 shows the TG and gas evolution behavior (temperature profile of MS signal) in each sample. It could be that during the synthesis of hydroxyapatite, the OH group is replaced with anions or a mixture of impurities resulting to a large difference in evolution behavior of gases. Although Sample 1 exhibited the smallest mass loss compared to other samples, the continuous mass loss can be observed up to 1400℃. In addition to the evolution of H_2O (m/z 18) and CO_2 (m/z 44), NO (m/z 30) and SO_2 (m/z 64) gases were also detected. Mass loss in Sample 2 can be observed at 400℃ and 600 ℃ where H_2O and CO_2 were evolved, respectively. Sample 3 revealed a large mass loss due to the evolution of CO_2 gas near 800℃ in which we were able to confirm the evolution of H_2O, NO and SO_2.

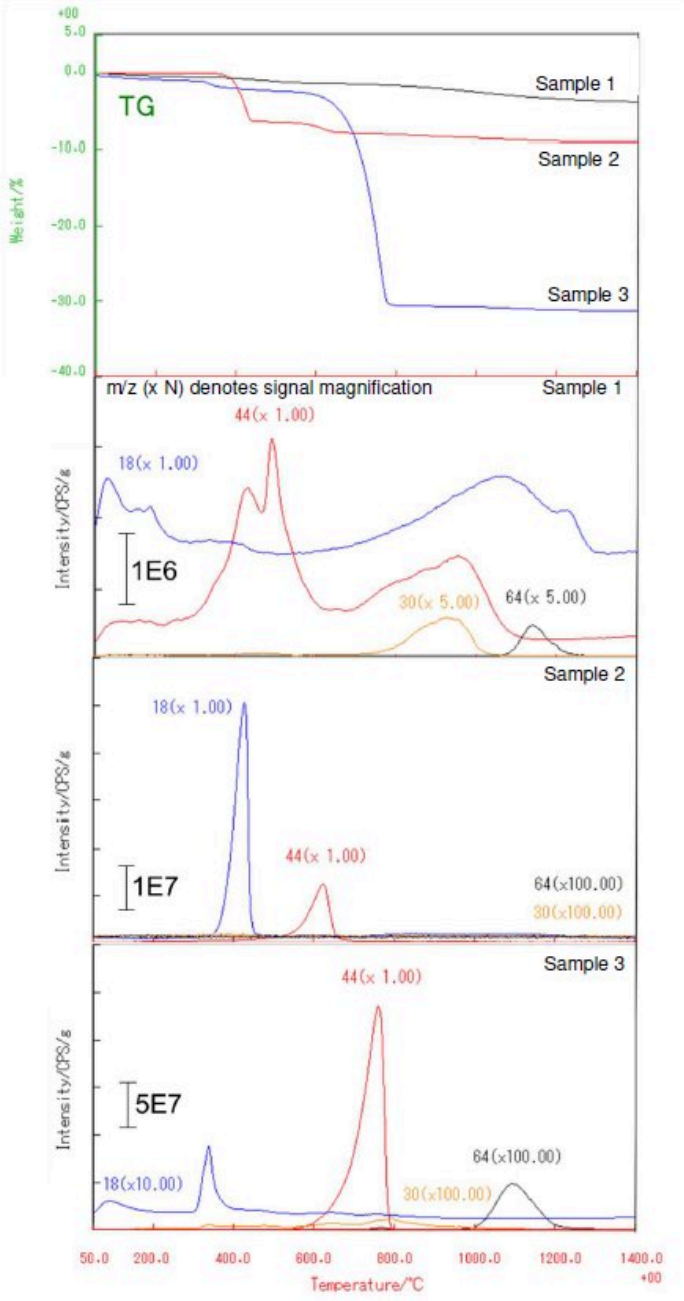
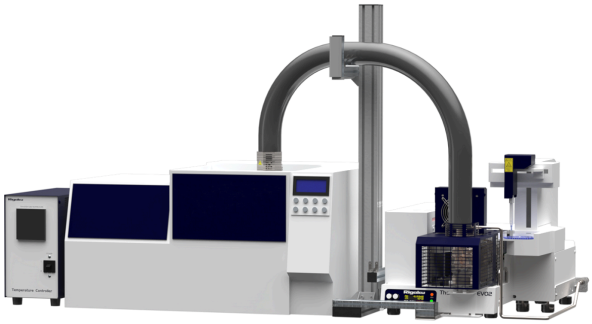


Figure 1: TG and evolution behavior of gases detected from all hydroxyapatite samples.

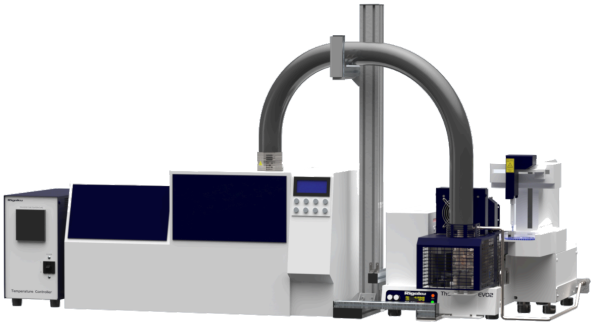
(The samples were kindly provided by Professor Masato Yamamoto, Showa University, Faculty of Arts and Sciences at Fujiyoshida)

Related products



STA/GC-MS

A thermal analysis device capable of highly sensitive simult aneous measurement of chemical reaction information that is difficult to determine with thermal analysis alone.



Sample observation STA/GC-MS

TG-GCMS measurements while observing the sample.