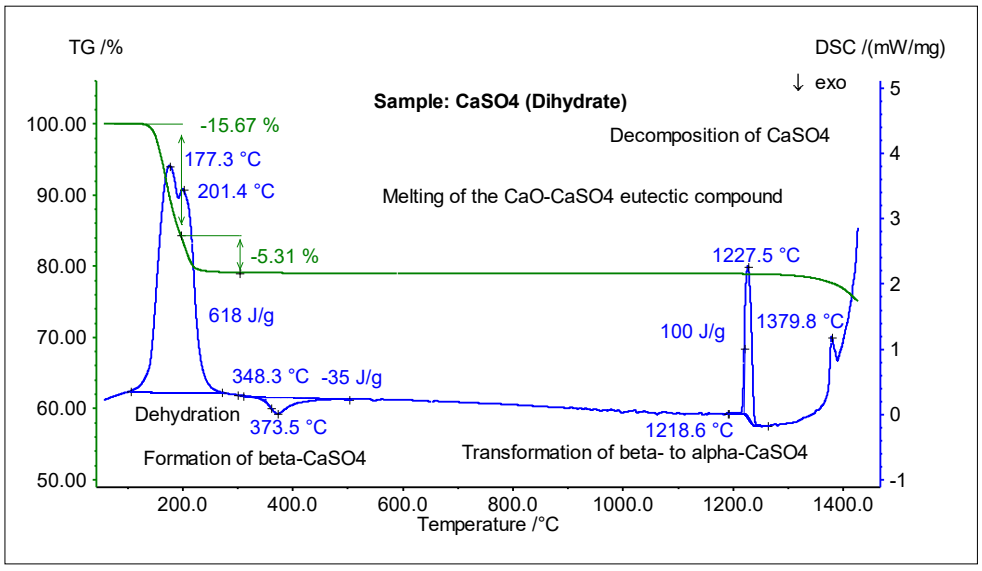
APPLICATION**SHEET**

Inorganics · Building Materials
STA 409

Gypsum (Calcium Sulfate Dihydrate)

Introduction

Calcium sulfate materials (gypsum) are popular materials used in several building applications. When calcium sulfate halfhydrate is mixed with water, it re-forms into gypsum (dihydrate), initally as a paste but enventually hardening into a solid. The structure consists of sheets of Ca_2+ and So_4 2- ions held together by hydrogen bonds of the water molecules. The grip between these sheets can easily be broken, so gypsum is fairly soft. Gysum is used as a building material similar to mortar or cement. Like those materials, plaster starts as a dry powder that is mixed with water to form a paste which then hardens. Unlike those materials, plaster remains quite soft after drying, and can easily be manipulated with metal tools or even sandpaper. These characteristics make plaster suitable for a finishing rather than a load-bearing material.



Test Conditions

Temperature range:	RT ...1500°C
Heating rate:	20 K/min
Atmosphere:	Argon at 60 ml/min
Sample mass:	38.68 mg
Crucible:	Pt with lid
Sensor:	DSC type S

Test Results

Between 100 and 300°C, the double-step dehydration of the calcium sulfate-dihydrate occurred. In the first step, 1.5 of 2 water molecules were released from the system and half-hydrate was formed. In the second, the half-hydrate dehydrates further on and forms anhydrate. Starting at 348°C, the anhydrate converts to β-calcium sulfate (exothermal effect). At 1219°C, the β-calcium sulfate converts to α-calcium sulfate, clearly visible as a sharp endothermal effect in the DSC curve. At temperatures above 1250°C, a further mass loss can be seen. This mass loss refers to the sulfate decomposition. Calcium sulfate converts into calcium oxide. The endothermal peak at 1380°C is due to melting of an eutectic mixture of calcium sulfate and calcium oxide.

NGB · Application Sheet 009 · E · 0521 · Technical specifications are subject to change.

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