

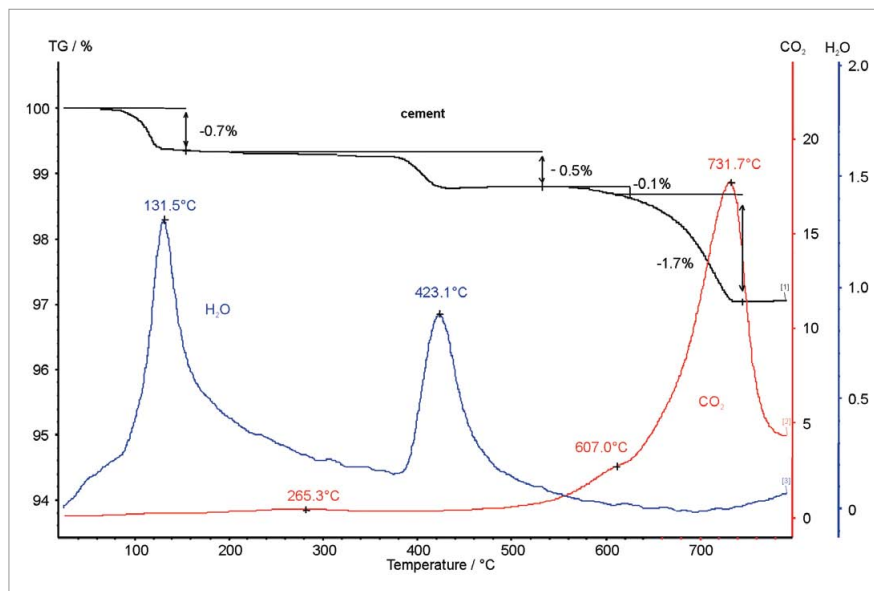
APPLICATION SHEET

INORGANICS – BUILDING MATERIALS

CEMENT

Portland cement is produced by heating of limestone with clay and/or sand up to about 1480°C. To the resulting clinker, 4 to 5% gypsum is mixed and then grinded and milled to a fine grain size of approx 10 mm. The additives gypsum, anhydrite etc. influence the setting time of the

cement. Impurities in the raw material can have a negative influence on the quality of the cement. Magnesia i.e. causes expansion and deterioration of cements on long exposure, and its presence of more than 5% is not desirable.



Instrument

TG 209 **F1 Iris**® – FTIR

Test Conditions

Temperature range	RT... 800°C
Heating rate	10 K/min
Atmosphere	Air at 40 ml/min
Sample mass	43.6 mg
Crucible	Pt/Rh with lid
Sensor	TG type Platinel

Results

With thermoanalytical methods, the components (additives) of cement can be identified and quantified. The combination of thermogravimetry with an evolved gas analysis method (i.e. mass spectrometry or Fourier transform infrared spectroscopy) is a very powerful method since the evolved gases can be identified. The water evolved from the CaSO₄ dihydrate and hemihydrate (1st TG step) and Ca(OH)₂ (2nd TG step) can be verified by FTIR analysis. The decomposition of carbonates (calcite, dolomite) is found in the temperature range between 600°C and 750°C. The MgCO₃ amount of the dolomite decomposes before CaCO₃ and is also seen as a shoulder in the CO₂ trace of the FTIR signal.