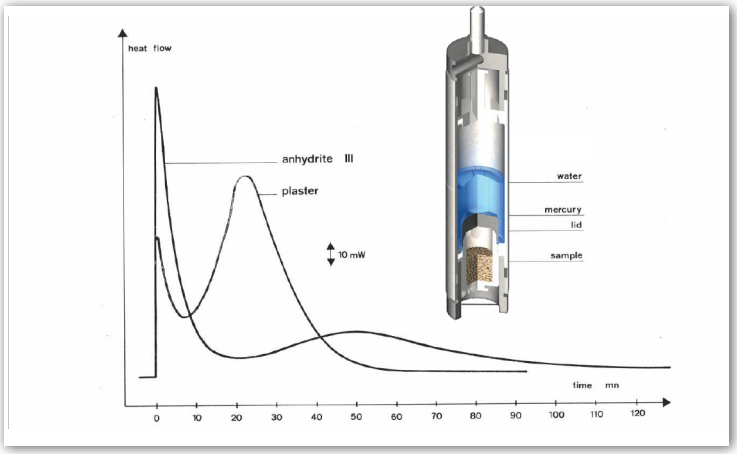
Hydration of two calcium sulfates (plaster and anhydrite III)

INTRODUCTION

• Four forms of calcium sulfate are known : dihydrate $CaSO_4.2H_2O$ (gypsum), hemihydrate $CaSO_4.½ H2O$ (plaster) and two anhydrites $CaSO_4$: natural and insoluble anhydrite and soluble anhydrite III (obtained by heating plaster to 200°C).
• Plaster and anhydrite III, which are soluble in water , are used in the building industry, because of their setting properties.
• Mixing calorimetry is a particularly interesting method for the study of short-term and long term heat effects during the setting of calcium sulfates.



EXPERIMENT

Samples : 1) Plaster (625 mg) + Water (500 mg)
2) Anhydride III (625 mg) + Water (500 mg)
Crucible : Reversal mixing cell
Heating mode : Isothermal 28°C

RESULTS AND CONCLUSION

At initial time, sample and water are separated by a lid in the mixing cell. The mixing of the two compounds is carried out by reversing the calorimeter. Two stages can be seen on the recorded thermograms :
• short term dissolution of the sample in
• longer term setting of the mixture (hydration)
The rate of setting can be characterised by the time (to reach the top of the hydration peak.
Thus setting of plaster ($t_{1/2}$ = 25 min) is faster than the setting of anhydrite ($t_{1/2}$ = 50 min).$_{1/2}$

INSTRUMENT

CALVET

Ambient to 300°C

HIGHEST HEAT MEASUREMENT ACCURACY 3D sensor based on thermocouples with Joule effect calibration.

ISOTHERMAL OR TEMPERATURE SCANNING MODES
for increased flexibility and replication of real life conditions

CONVENIENT INTERCHANGEABLE CRUCIBLES AND CELLS
to perform even the most demanding experiments using one instrument :
• high pressure (1000bar) and high vacuum
• pressure measurement and control
• mixing/stirring experiments.

EXTERNAL COUPLING CAPABILITY
designed to increase your research options including manometry, BET instrumentation, gas analyzers, humidity controllers and gas panels

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