



Contribution ID: 628

Type: **Poster + 3 Minute Pitch**

Direct observation of the moisture distribution in castables at high temperatures as studied by NMR

Wednesday 16 May 2018 16:55 (2 minutes)

In this study, the drying behavior for a variety of calcium alumina- and hydratable alumina-bonded refractory castables was investigated in the temperature regime of first-drying, i.e., up to 300 °C. Using a specialized high-temperature Nuclear Magnetic Resonance (NMR) setup, we were able to directly and non-destructively measure the spatially and temporally resolved moisture distribution, while simultaneously measuring the temperature distribution as well. We employ a high-temperature correction scheme that calibrates the effects of the surface relaxation for rising temperatures. This setup makes use of a high-sensitivity Birdcage-coil for measuring the quantitative moisture content at high-temperatures, while also utilizing a mini-coil for calibrating relaxation changes, as a function of temperature and hydration state, taking place in the sample throughout a drying experiment. These measurements give for the first time a direct insight into the drying behaviour of castables and show that the drying front speed and temperature are strongly correlated with control of key material parameters such as binder content and water demand. In addition these measurements provide a direct insight into the steam pressures which are generated within the samples and hence in the risk of explosion.

References

Acceptance of Terms and Conditions

[Click here to agree](#)

Authors: Dr PEL, Leo (Eindhoven University of Technology); Mr BARAKAT, Ahmed (Eindhoven University of Technology); Prof. ADAN, Olaf (Eindhoven University of Technology)

Presenter: Dr PEL, Leo (Eindhoven University of Technology)

Session Classification: Parallel 8-D

Track Classification: MS 3.01: Application of NMR Methods to Porous Media: