

# How Important is Microquartz Cement for Reservoir Properties?

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## Abstract

Microquartz coatings have in several studies proven to preserve high porosity and permeability in reservoir sandstones. An unsolved question though is, whether microquartz always will have this effect or whether additional factors must be fulfilled. The Upper Jurassic Heno Formation from the Danish Central Graben, North Sea, provides examples of sandstones with a variety of cementing phases. Some sandstones are solely microquartz-cemented and some have a combination of quartz or microquartz and illite cement. Thus, the Heno Formation provides an excellent opportunity for revealing the effect of different combinations of cement types on reservoir properties. The resulting reservoir properties are quite different. The Heno Formation was deposited in back barrier and shoreface environment. Deposition took place under several relative sea-level fluctuations, which affected various areas and fault blocks differently. Hence, the exposure meteoric water flushing varied across the basin and is reflected in the intensity of feldspar weathering. In all, more than 200 sandstone samples from 14 well cores were investigated. Petrography of thin sections and rock chips from plug cut-offs were compared with plug porosity and permeability measurements. The highest porosity and permeability occur in sandstones with microquartz cement covering all detrital grains. Sandstones having both microquartz and illite coatings, show a lower permeability than the microquartz-cemented sandstones at similar porosity. Illite precipitation is promoted by degradation of detrital K-feldspar during burial. Sandstones in which K-feldspar is removed during weathering shortly after deposition show less illite precipitation during burial. Areas likely to have been experiencing prolonged exposure to weathering may be predicted from sequence stratigraphy and palaeogeography. Hence the risk of illite

precipitation may be evaluated from the likeliness of K-feldspar-rich sediment supply, expected degree of weathering and burial depth.

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