

Advances in Sandstone Reservoir Quality Prediction

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- 1. Sandstone reservoir quality prediction: The state of the art, by Joanna M. Ajdukiewicz and Robert H. Lander**
[All observed values of reservoir porosity should be predictable based on depositional and diagenetic processes. This issue of the Bulletin highlights recent advances in a new generation of reservoir quality models that have successfully predicted porosity and permeability in siliclastic reservoirs.]
- 2. Sandstone diagenesis and reservoir quality prediction: Models, myths, and reality, by Thomas R. Taylor, Melvyn R. Giles, Lori A. Hathon, Timothy N. Diggs, Neil R. Braunsdorf, Gino V. Birbiglia, Mark G. Kittridge, Calum I. Macaulay, and Irene S. Espejo.**
[Current ideas on sandstone diagenesis do not always fit the facts. Numeric models calibrated with analog data that simulate compaction and cementation are better predictors of porosity and permeability. Closer integration of diagenetic, depositional, and 3D basin models is a promising approach.]
- 3. Origin and timing of late diagenetic illite in the Permian–Carboniferous Unayzah sandstone reservoirs of Saudi Arabia, by Stephen G. Franks and Horst Zwingmann.**
[Diagenetic illite cement is formed by a reaction of detrital K-feldspar and early diagenetic kaolinite in the Unayzah sandstone. There is no evidence that hydrocarbon emplacement, deep brine migration, or unique thermal events have played a role in illite precipitation.]
- 4. A model for fibrous illite nucleation and growth in sandstones, by Robert H. Lander and Linda M. Bonnell.**
[Illite fibers tend to cause significant permeability reductions since they extend further into pores than other authigenic clays. The authors' kinetic model for fibrous illite nucleation and growth reproduces the pattern in occurrence of fibrous illite as well as kaolin and K-feldspar reactants.]
- 5. Prediction of deep reservoir quality using early diagenetic process models in the Jurassic Norphlet Formation, Gulf of Mexico, by J. M. Ajdukiewicz, P. H. Nicholson, and W. L. Esch.**
[In deeply buried sandstones, favorable reservoir quality can be preserved by early grain coats that inhibit later quartz cementation. Diagenetic chlorite coats, formed where dune sands subsided into hypersaline groundwater, preserve the best porosity and permeability.]

6. **Reservoir quality modeling of tight-gas sands in Wamsutter field: Integration of diagenesis, petroleum systems, and production data**, by Rick C. Tobin, Tony McClain, Robert B. Lieber, Aysen Ozkan, Laura A. Banfield, Ann M. E. Marchand, and Lee E. McRae.

[Diagenetic modeling can be a useful tool for predicting reservoir quality in tight gas sandstone reservoirs. The integration of technologies to simulate rock properties during burial provides a useful method for identifying and mapping under-exploited portions of a producing field.]

7. **The impact of diagenesis on the heterogeneity of sandstone reservoirs: A review of the role of depositional facies and sequence stratigraphy**, by S. Morad, Khalid Al-Ramadan, J. M. Ketzer, and L. F. De Ros.

[Variations in diagenetic alteration have significant control on the heterogeneity of clastic reservoirs. Integrating depositional and diagenetic processes improves hydrocarbon exploration and optimizes production through the design of appropriate simulation models for enhanced oil recovery strategies.]