
The Rosetta Stone Project – I: Spectral Analysis of Pore Geometries and Their Relationships to Depositional Facies for the Arab D Limestones

Edward A. Clerke, Saudi Aramco, Saudi Aramco, Box 10607, Dhahran, 31311, Saudi Arabia, phone: 966 3 874 5176, edward.clerke@aramco.com and **Harry W. Mueller, III**, Saudi Aramco, Saudi Aramco, Expec Building, Dhahran, 31311, Saudi Arabia.

The Rosetta Stone project was launched to investigate the observation that one class of depositional facies descriptors also clearly subdivided the sample set by pore system properties. In 2001, Aramco acquired a much more extensive data set from 10 cored wells and containing: geological, petrophysical and reservoir property data.

This massive Mercury Injection Capillary Pressure data set was acquired on 484 samples from ten wells in a major carbonate reservoir and sample MICP data were all analyzed using the Thomeer method. Statistical reduction of the frequency occurrence of Thomeer parameters that arise from these fits to the Rosetta Stone samples show:

- A new carbonate porosity concept is founded – Porositons, which are distinct and separable Pore Throat size distribution modes, and the existence of Porobodons is conjectured, which are distinct and separable Pore Body size distribution modes.
 - Four porositons are the fundamental building blocks of the Arab D limestone pore systems (M: macroporosity and Type 1, 2, 3 microporosity)
 - Porositon, M, carries 99.98% of the permeability of the multimodal pore systems
 - Porositon 1, is a form of microporosity prevalent in the best reservoir rocks
 - The Arab D limestones contain only nine pore system combinations which are made up from one or more of the four porositons, e.g., M_1
 - Each of the HWM geologic facies are characterized by a small number of the porositon combinations
 - A common limestone matrix pore system, M_1, acts to a first approximation as a dual porosity – single permeability system
 - The presence of porositons and potentially porobodons, infers that mode analysis of NMR signals can be applied for Arab D limestone facies detection.
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