

## Characterization of the Pore System and Gas Storage Potential in Unconventional Reservoirs: A Case of Study of the Cretaceous la Luna Formation, Middle Magdalena Valley Basin, Colombia

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**Abstract :** We propose a generalized workflow for mineralogy investigation of unconventional reservoirs using multi-scale imaging and pore-scale analyses. This workflow can be used for the integral evaluation of these resources. The Cretaceous La Luna Formation's mudstones in the Middle Magdalena Valley Basin (Colombia) inherently show a heterogeneous pore system with organic and inorganic pores. For this reason, it is necessary to carry out the integration of high resolution 2D images of mapping by conventional petrography, scanning electron microscopy and quantitative evaluation of minerals by scanning electron microscopy to describe their organic and inorganic porosity to understand the transport mechanism through pores. The analyzed rocks show several pore types, including interparticle pores, organoporosity, intraparticle pores, intraparticle pores, and microchannels and/or microfractures. The existence of interconnected pores in pore system of these rocks promotes effective pathways for primary gas migration and storage space for residual hydrocarbons in mudstones, which is very useful in this type of gas reservoirs. It is crucial to understand not only the porous system of these rocks and their mineralogy but also to project the gas flow in order to design the appropriate strategies for the stimulation of unconventional reservoirs. Keywords: mudstones; La Luna Formation; gas storage; migration; hydrocarbon.

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