Numerical modeling of methane, carbon dioxide and water generated by subbituminous coals from Maracaibo Lake Basin, Venezuela

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Literature reports several ways to estimate volatile released with the increase of the coal rank, from compositional data. However, the mathematical models are usually restricted to high rank coals, due to their lesser scattering in the immediate and elemental analysis data. The aim of this work is the development of a numerical model of the gas generative potential in low rank coals.

The proposed model takes data using 205 coal samples from low to intermediate rank (Rm 0.3-1.1%) all of them from the same sequence, in the Lake Maracaibo Basin (Paleocene - Oligocene). Immediate and elemental analyses allowed to calculate linear expressions of chemical composition for both the starting coal and the ejected volatiles.

In order to simplify the calculations, water, methane and carbon dioxide are fixed as main products, adjusted to the experimental evidences and kinetic considerations in low rank coals. The model establish that water and carbon dioxide are the only produced gases at the beginning of the maturation. On the other hand, with the maturity increase, the study predicts a volatile evolution of 325 m^3/ton of coal, where carbon dioxide is the main component (~47 % v/v), 38% water, y at least 49,5 m^3/ton (15%) methane. This result is near six times the amount of this gas reported by Tang et al.[1] (300 cf/ton or 8,5 m^3/ton) as threshold in low rank coal.

[1]Tang, Y., Jenden, P. D., Nigrini, A. & Teerman, S. C. (1996). *Fuel Energy Abstr.* **37,** 342.