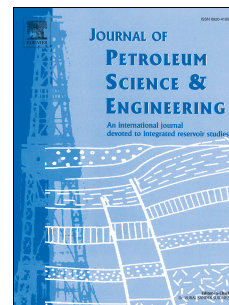


Accepted Manuscript

Theoretical and experimental determination of the fractal dimension and pore size distribution index of a porous sample using spontaneous imbibition dynamics theory

Mumuni Amadu, Michael J. Pegg



PII: S0920-4105(18)30344-9

DOI: [10.1016/j.petrol.2018.04.037](https://doi.org/10.1016/j.petrol.2018.04.037)

Reference: PETROL 4889

To appear in: *Journal of Petroleum Science and Engineering*

Received Date: 2 February 2018

Revised Date: 6 April 2018

Accepted Date: 14 April 2018

Please cite this article as: Amadu, M., Pegg, M.J., Theoretical and experimental determination of the fractal dimension and pore size distribution index of a porous sample using spontaneous imbibition dynamics theory, *Journal of Petroleum Science and Engineering* (2018), doi: 10.1016/j.petrol.2018.04.037.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**THEORETICAL AND EXPERIMENTAL DETERMINATION OF THE FRACTAL
DIMENSION AND PORE SIZE DISTRIBUTION INDEX OF A POROUS SAMPLE
USING SPONTANEOUS IMBIBITION DYNAMICS THEORY**

Corresponding Author: Mumuni Amadu

Email: mumuniamadu@hotmail.com/mm846771@dal.ca

Department of Process Engineering and Applied Science

Dalhousie University

Halifax-Nova Scotia

Coauthor: Michael J. Pegg

Email: M.Pegg@dal.ca

Department of Process Engineering and Applied Science

Dalhousie University

Halifax-Nova Scotia

ABSTRACT

The fractal dimension of a porous sample is a microstructural parameter that has a strong bearing on physical, biological and physicochemical processes in addition to determining the degree of heterogeneity or homogeneity of sediments. In the petroleum and allied industries, several methods including the mercury intrusion method have been used for the determination of the fractal dimension of porous samples.

In this study, we have used a spontaneous imbibition dynamics model that integrates the fractal dimension parameter in addition to other microstructural parameters and fluid properties for experimental purposes. Using mathematical approach, this model has permitted us to use experimental data on spontaneous imbibition rise versus time to determine for the first time, the fractal dimension and pore size distribution index of Wallace Sandstone from Nova Scotia after petrophysical and fractal characterizations of core samples. Wallace sandstone is an outcrop and values of fractal dimensions deduced using samples of this sandstone agree with those deduced using *in situ* methods in open cast mines reported in the literature. What is more, the mean value

Download English Version:

<https://daneshyari.com/en/article/8124882>

Download Persian Version:

<https://daneshyari.com/article/8124882>

[Daneshyari.com](https://daneshyari.com)