

SUMMARY OF CONTENT

There are six papers in this issue of the journal. The first paper, *Optimization of Kartoatmodjo and Schmidt Oil Formation Volume Factor Correlation with Particle Swarm Optimization Algorithm*¹ emphasises the unique position and importance of reservoir fluid properties in reservoir engineering calculations such as reserves estimates, material balance equation, and numerical reservoir stimulation etc. The paper identifies laboratory measurements as the most dependable methods for pressure-volume-temperature (PVT) analysis of reservoir fluid properties. It observes that during reservoir performance evaluation, the measurements of PVT data are not readily available, hence engineers resorted to the use of existing empirical correlations to obtain PVT data. Often time, the data obtained from correlations do not agree with the experimental data, thereby yielding a considerable amount of error. They note that to correct this error, Kartoatmodjo and Schmidt correlation for estimating the oil formation volume factor was optimized using the particle swarm optimization (PSO) algorithm to minimize the error in estimating the oil formation volume factor from Kartoatmodjo and Schmidt correlation at various depletion pressure. The optimized correlation they assert is a function of bubble point pressure, API gravity, gas gravity and reservoir temperature. Therefore, to validate the optimized correlation, they used PVT data from differential liberation test in the laboratory as case a study and the result obtained with the optimized correlation matched closely with the experimentally values at various depletion pressure. Also, they validated Kartoatmodjo and Schmidt optimized correlation with Standing, Kartoatmodjo and Schmidt, Glaso and Petrosky-Fashad correlations. The optimized Kartoatmodjo and Schmidt gave the least average relative error of ± 0.00065 and the highest correlation coefficient of 0.99996 after 154th successive iterations with the PSO algorithm. Very interesting paper and findings to peruse.

The send paper is on *Application of Sequence Stratigraphy Principles: A Case Study of the Emi Field Offshore Depobelt, Eastern Niger Delta Basin, Nigeria*². Here, the authors applied principles of sequence stratigraphy in the study of the Emi Field, Offshore Depobelt, Eastern Niger Delta. Using 3D seismic data, wireline logs of six wells, check shots, and biostratigraphic data sets, two sequence boundaries and three maximum flooding surfaces were identified as the key surfaces of three depositional sequences. Marker shales, characterized by index fossils *Haplophramoides-24* and *Bolivina-48* were used to date the maximum flooding surfaces, separated by the 5.6 Ma and 4.1Ma sequence boundaries. Based on log motifs and biostratigraphic data, the stratigraphic interval penetrated by the six wells was inferred to be deposited in a neritic paleoenvironment. Two major faults named F1 and F3 run across the study area and closures considered as good hydrocarbon prospects were identified and delineated. Analysis of horizons within the sequences and individual systems tracts reveals that hydrocarbon is hosted both in reservoirs within the transgressive systems tracts and highstand systems tracts. The paper concludes that the existence of reservoirs, and the presence of well-developed fault systems in the sands associated with the systems tracts, indicates that the Emi field has great potential for

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hydrocarbon productivity.

The third paper³ examines *Particle Swarm Optimization of Reservoir and Well Parameters Using Drawdown Test*. The authors observe that pressure transient testing provides an indirect determination of reservoir and well parameters. In their view, it is one of the most essential techniques used to provide details about the reservoir characteristics and well conditions. They also note that there are several tests available to properly characterize well and reservoir parameters, in this study, with drawdown test considered with an objective to obtain permeability and skin of a reservoir within the drainage area, from a pressure survey data. They also observe that several methods have been developed to obtain skin and permeability from drawdown test, with the conventional method using the graphical technique where the pressure and time data are analysed with a semi-log plot. The results they obtained using this method do not equate the actual parameters of the reservoir, therefore, they confirmed the need to optimize this error. The study is focused on minimizing the error in the mathematical model with particle swarm optimization algorithm. The manual analytical method and the particle swarm algorithm were done in Microsoft Excel. Data was obtained from a well in the Niger Delta region of Nigeria. The results from the algorithm showed a higher level of accuracy, compared to the results obtained from the manual analytical method. The statistical analysis indicates a better result with the particle swarm optimization algorithm, with a relative error of 0.0510 against the 3.9743 from the conventional method. Also, correlation coefficient, R-value of 0.9999 against 0.4733 from the conventional method.

The fourth paper⁴ is on the *Effectiveness of Cellulose from Waste Paper Material as Water-Based Mud Viscosifier on Rheological Properties of Oil and Gas Drilling Fluids*. The study experimentally examined the effectiveness of waste paper cellulose as a viscosifier. Rheological properties such as density, pH and rheology (plastic viscosity, yield point) tests were performed and compared to a control mud. The mud samples were beneficiated to meet API specification for drilling fluids. The paper observes that at temperatures 28, 45 and 60 °C, the sample and control muds had the same density of 8.7 lb/gal; the pH values were 7.5 and 7.7, respectively. They have the same average plastic viscosity of 4.3 (± 0.3) cp; while the average yield point values were 17.0(± 0.3) and 12.0(± 0.4) lb/100sqft, respectively. After the mud samples were beneficiated, results showed that, the sample mud with density of 8.8 lb/gal, pH of 9.0 ± 0.4 , average plastic viscosity of 12 cp and yield point of 37 lb/100sqft compared with control mud density of 8.7 lb/gal, pH of 9.3 ± 0.3 , average plastic viscosity of 11 cp and yield point of 40 lb/100sqft. From the results, the paper concludes that cellulose extracted from waste paper can replace standard viscosifiers.

*Effects of Gasoline on Haematological Parameters of Gasoline Station Workers in Onitsha, Anambra State, Nigeria*⁵ is the fifth paper. It assesses the effects of gasoline on the haematological parameters of gasoline station workers (GSWs) in Onitsha, as a follow-up of the previous study by the authors on the toxicological and biochemical profile of GSWs in the same area. The study suggests that GSWs are highly exposed to toxic gasoline vapour and reduced haematological parameters among the workers exposed for longer durations further suggest the presence of iron deficiency anaemia and leukocytopenia among them, which could consequently affect red blood cell production and functions, and immunity deficiency.

³ By Asanimio Racheal and Okotie Sylvester

⁴ Oluwatoyin O. Akinsete and Daniel G. Adeyinka

⁵ Anyiam, et al

The sixth paper is on *Predictive Models on Viable Options for Liquefied Petroleum Gas (LPG) Distribution: A Case for Small and Medium Scale Enterprise (SME) Commodity in Nigeria*.⁶ The paper describes Liquefied Petroleum Gas (LPG), as a product of natural gas processing that is a mixture of hydrocarbon gases mainly propane, butane, butylene and impurities such as sulphur compound. LPG production and distribution in Nigeria according to the authors appear to have had limited growth over the last three decades before 2016. In this study, a stochastic model is applied to secondary historical data from 1994 to 2020, on the production, consumption and streamline distribution pattern for the country. Certain assumptions were made including changes in the various stages in the production value chains (production, storage, distribution, pipeline infrastructure, and supply chains) in-country. Linear regression and correlation approaches were adopted, using the models which agreed with the plots from the Department of Petroleum Resources. It indicated that LPG consumption increased rapidly from 2016 upward following increases in infrastructural surplus, investment and awareness enlightenment initiatives.

The results obtained have a strong correlation between demand-supply bond driven by market forces in the urban and suburban cities in-country. These indicators according to the authors, can be considered reliable parameters for sustainable strategic planning, policy development and implementation for rapid economic recovery.

⁶ Jacob B. Neeka, Uche Ikoku, Sunday S. Ikesimama and Joel Ogbonna