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Data Article

Dataset on investigating the effect of sunflower based biodiesel on the rheology of Nigeria waxy crude oil



Adesina Fadairo^{a,*}, Temitope Ogunkunle^a, Victor Asuquo^a,
Adebowale Oladepo^a, Babajide Lawal^b

^a Covenant University, Ota, Nigeria

^b PricewaterhouseCoopers, USA

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ABSTRACT

This paper presents information about the data obtained from the experimental research showing the effect of sunflower based biodiesel on rheological properties of Nigeria waxy crude oil. The information reported in the dataset depicts 0.1–0.7% dosing concentration of sunflower based biodiesel might be required for viscosity reduction of Nigeria waxy crude oil at operational temperatures ranging from 10 °C (at low temperature region) to 60 °C (at mid temperature region). It has also demonstrated that biodiesel derived from sunflower is technically viable to decrease the viscosity of Nigeria waxy crude oil appreciably, hence revealing its potential capacity to enhancing flow of the oil in pipeline and wellbore system.

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Specifications Table

Subject area	<i>Petroleum Engineering</i>
More specific subject area	<i>Petroleum Production Engineering, Flow Assurance</i>
Type of data	<i>Table</i>

* Corresponding author.

E-mail addresses: adesinafadairo@yahoo.com, adesina.fadairo@covenantuniversity.edu.ng (A. Fadairo).

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How data was acquired	OFITE viscometer.
Data format	<i>Raw and analyzed</i>
Experimental factors	Nigeria waxy crude was collected Niger- Delta region, pre-treated by heating the crude above 100 °C to remove water and possibly some contaminants and the properties of the crude were investigated. The sunflower oil was purchased, characterized and converted into biodiesel
Experimental features	The sunflower oil was characterized and converted into biodiesel by trans-esterification, the Nigeria waxy crude properties were also investigated upon the addition of sunflower based biodiesel at operational temperature of 10 °C to 60 °C.
Data source location	<i>Niger-Delta, Nigeria</i>
Data accessibility	Data are available within this article and student project of Department Petroleum Engineering, Covenant University, Nigeria
Related research article	<i>None</i>

Value of the data

- Data validate that the biodiesel gave a key performance indicator on the rheological properties of the Nigerian waxy crude especially at operational temperatures range from 10 °C to 60 °C.
- Data shows that viscosity of waxy crude oil decreases with addition of small concentrations of sunflower based biodiesel as additive at the same temperature.
- Data presented in this study is a pointer to show that sunflower based biodiesel is technically, environmentally and economically viable to serves as additive for enhancing flow of waxy crude in pipe.
- Data presented also shows that sunflower based biodiesel is one of the biodegradable agricultural product which can be applied as viscosity reducing and flow improver agent in oil and gas industry.

1. Data

Wax deposition is one of the most important challenges in the production of crude oil and production of hydrocarbon as reported in Ref. [1]. The problem generated by wax deposits is special concern in the production of crude oil at deep water where production fluid be cooled to nearly the temperature of the surrounding waters, hence decreasing the viscosity and retarding flow in pipe [2–4]. There is high demand of industry to achieve flow assurance throughout the production life of waxy crude oil. Experimental work in this data has shown that sunflower has technical potential to decrease the viscosity of Nigeria waxy crude oil appreciably.

Sunflower oil is mainly triglycerides (fats), typically derived from the fatty acids linoleic acid (which is doubly unsaturated) and oleic acid, a typical constituent is shown.

- Palmitic acid (saturated): 5%
- Stearic acid (saturated): 6%
- Oleic acid (monounsaturated omega-9): 30%
- Linoleic acid (polyunsaturated omega-6): 59%

Several other types of sunflower oils are produced, such as high linoleic, high oleic and mid oleic. Mid-oleic sunflower oil typically has at least 69% oleic acid. High oleic sunflower oil has at least 82% oleic acid. Variation in unsaturated fatty acids profile is strongly influenced by both genetics and climate. Table 1 shows the percentage of fatty acid composition by weight used as the basis for production of edible oil.

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