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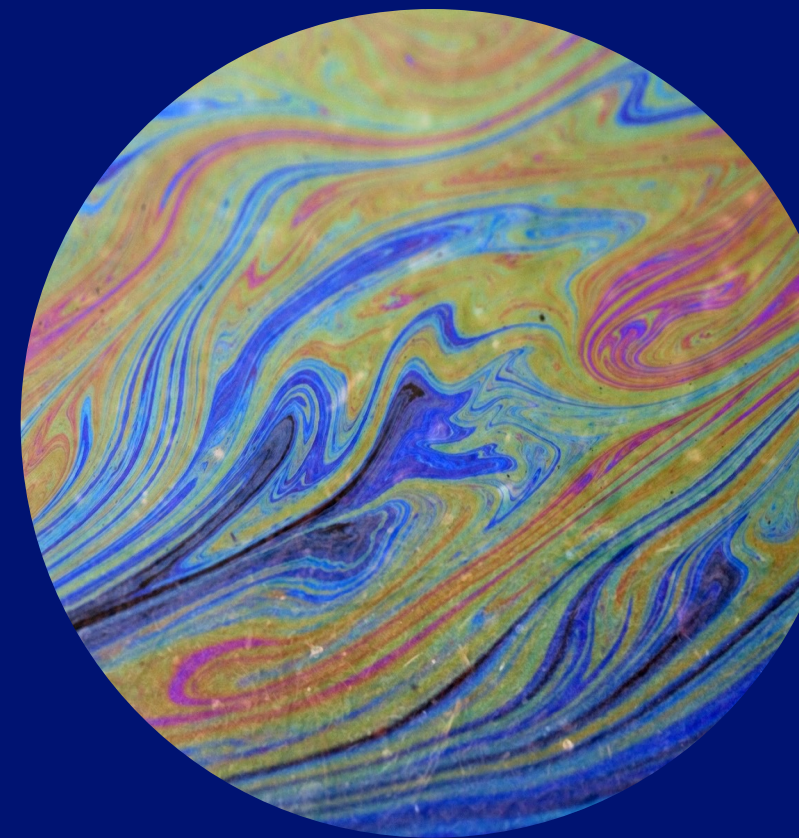
# Nontox

## Results Report — Environmental Performance (Ecotoxicity) and Efficiency Evaluation

Report date: April 2026

Supplier: Tratamientos Químicos Industriales S.A.S. BIC

Testing laboratory: Colombian Petroleum and Energy Transition Institute (ICPET) – Ecopetrol S.A.



THIS REPORT IS NOT A PRODUCT QUALITY CERTIFICATE



English translation of the original Spanish document (6 pages). Values are reproduced as reported.

# Scope of the technology test

The following are the results of the product characterisation carried out in the laboratories of the Colombian Petroleum and Energy Transition Institute (ICPET) of ECOPETROL, as part of the technology test agreement entered into between Ecopetrol S.A. and Tratamientos Químicos Industriales S.A.S. BIC, whose purpose is:

*“Performance of the Technology Test named NONTOX at the Colombian Petroleum and Energy Transition Institute – ICPET of ECOPETROL, to evaluate its environmental performance (ecotoxicology evaluation) and efficiency, under a non-exclusive, non-binding relationship regarding the future acquisition of the idea, design, prototype, product or technology, in accordance with the specific conditions set out in this Agreement and its technical annexes.”*

**THIS REPORT DOES NOT CONSTITUTE A PRODUCT QUALITY CERTIFICATE**, as stated in paragraph 2 of the third clause of the aforementioned agreement.

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# 1. Ecotoxicity

Table 1. Ecotoxicity test results.

| Method           | Binomial | Probit | Logit | WET EPA |
|------------------|----------|--------|-------|---------|
| LC50 value (ppm) | 46.14    | --     | ---   | --      |

## How to read the LC50

Lapa et al. (2002) and EPA WET define  $TU = 100 / LC50$  with LC50 as a percent of the sample. That is the frame used for effluent and leachate — a stream that is already the thing being discharged.

ICPET did not report an LC50 in percent. It reported 46.14 ppm of NONTOK in the test water. Equation 1 only applies after that ppm value is converted to %.

Equation 1 — LC50 must be in percent

$$TU = (1 / LC50\%) \times 100$$

## Two ways to apply it — only one is in-use

Neat product: 1% = 10,000 ppm, so 46.14 ppm = 0.004614%. Equation 1 then gives  $TU \approx 21,673$ . That describes 100% NONTOK, not treated water.

Use solution:  $TU_a = \text{use concentration} \div LC50$ . At 1 – 10 ppm that is  $1 \div 46.14$  to  $10 \div 46.14$ , or TU 0.02 – 0.22 — Table 2's  $TU \leq 1$  band (no acute toxicity observed).

The original report prints Equation 1 and Table 2 but does not compute a TU. In-use  $TU_a$  is the figure that matches how NONTOK is applied.

Table 2. Toxic Unit ranges and their toxicological meaning. Adapted from Lapa et al. (2002).

| Toxic Unit range   | Toxicological meaning             |
|--------------------|-----------------------------------|
| $TU \leq 1$        | No acute toxicity observed        |
| $1 < TU < 10$      | Acute toxicity observed           |
| $10 \leq TU < 100$ | High acute toxicity observed      |
| $TU \geq 100$      | Very high acute toxicity observed |

## IN-USE TOXIC UNITS

$$TU \approx 0.22$$

at 10 ppm ·  $TU_a = 10 \text{ ppm} \div 46.14 \text{ ppm}$

$TU \leq 1 \rightarrow$  No acute toxicity observed

1 ppm  $\rightarrow$  0.02    10 ppm  $\rightarrow$  0.22    (both  $TU \leq 1$ )

Neat-product  $TU \approx 21,673$  uses Equation 1 on undiluted NONTOK. Lapa / WET bins apply to the use solution, not the concentrate.

Original report states LC50 only. In-use  $TU_a = \text{use concentration} \div LC50$  at typical treatment doses (1 – 10 ppm).

# 2–3. Kinematic and dynamic viscosity

Table 3. Kinematic viscosity characterisation results.

| Temperature (°C)                   | 20   | 30   | 37.8 | 40   |
|------------------------------------|------|------|------|------|
| Kinematic viscosity (mm²/s or cSt) | 3.46 | 3.13 | 2.99 | 2.97 |

Figure 1. Kinematic viscosity test results.

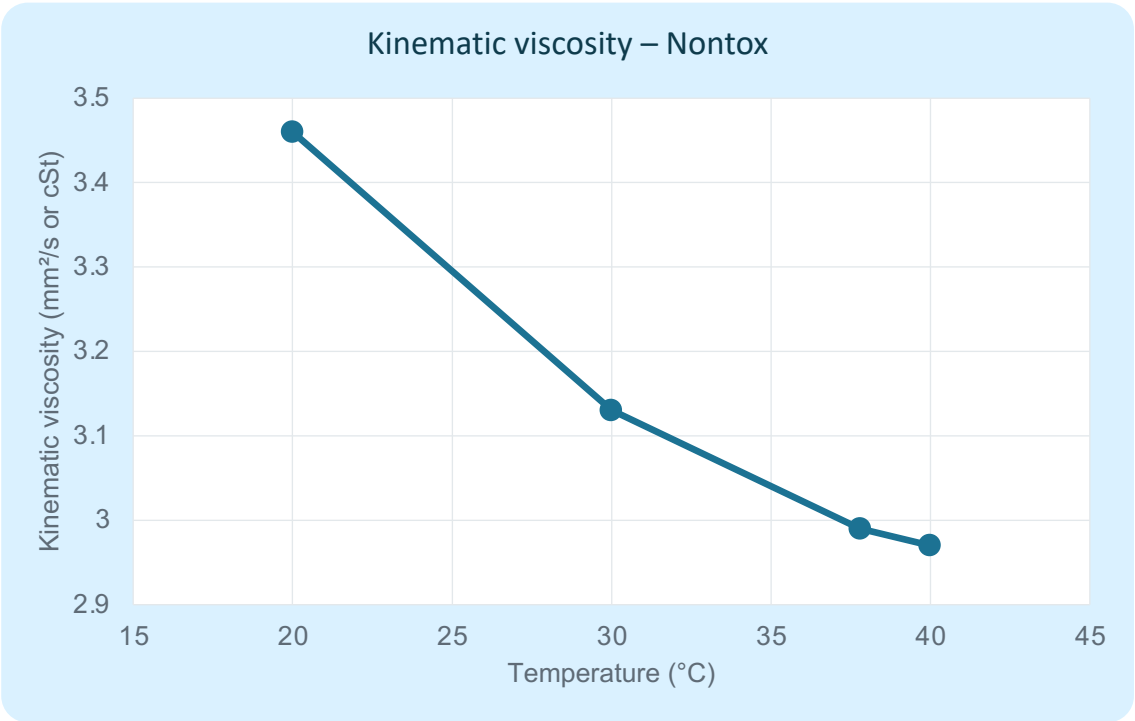
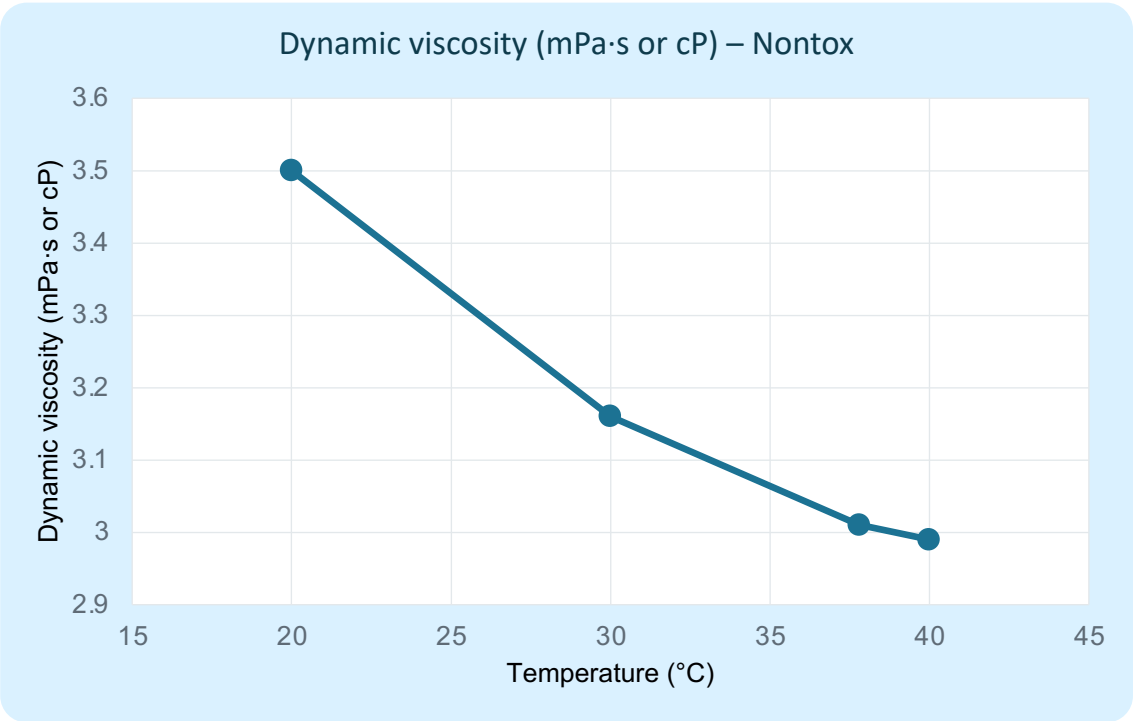


Table 4. Dynamic viscosity characterisation results.

| Temperature (°C)                | 20  | 30   | 37.8 | 40   |
|---------------------------------|-----|------|------|------|
| Dynamic viscosity (mPa·s or cP) | 3.5 | 3.16 | 3.01 | 2.99 |

Figure 2. Dynamic viscosity test results.



# 4. Density

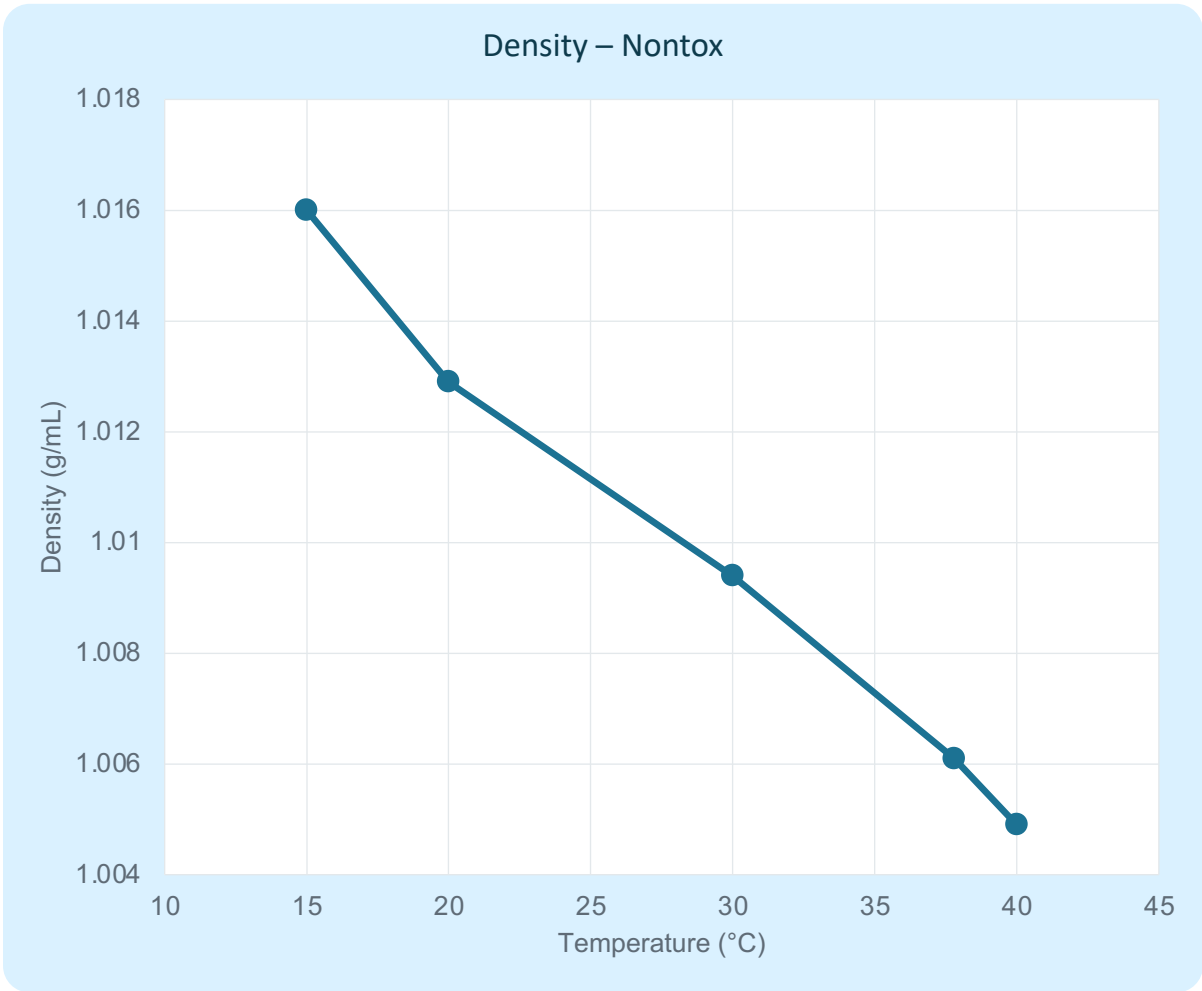
Table 5. Density characterisation results.

| Temperature (°C) | 15    | 20     | 30     | 37.8   | 40     |
|------------------|-------|--------|--------|--------|--------|
| Density (g/mL)   | 1.016 | 1.0129 | 1.0094 | 1.0061 | 1.0049 |

1.016 → 1.0049 g/mL

Density decreases steadily with temperature between 15 °C and 40 °C (values as measured at ICPET).

Figure 3. Density test results.



# 5. Other properties

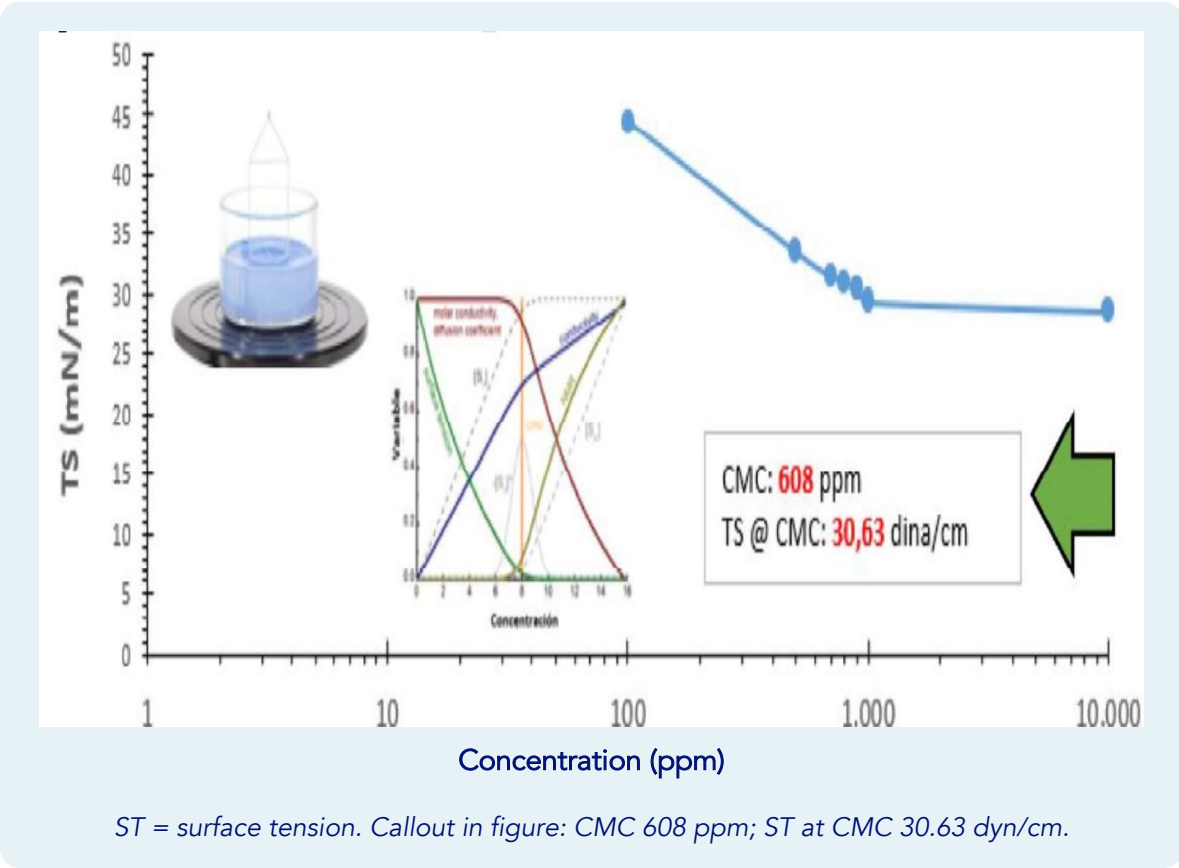
Table 6. Summary of results for other properties.

| Property                                   | Value |
|--------------------------------------------|-------|
| Refractive index (dimensionless)           | 1.35  |
| Specific gravity at 60 °C (dimensionless)  | 1.02  |
| API gravity (°API)                         | 7.68  |
| Viscosity–gravity constant (dimensionless) | 1.02  |
| Critical micelle concentration (ppm)       | 608   |
| Surface tension (dyn/cm)                   | 30.63 |

CMC 608 ppm

Surface tension at the CMC: 30.63 dyn/cm

Figure 4. Critical micelle concentration.



## 6. Qualitative solubility tests

Figure 5. Photographic record of the qualitative solubility tests.

Original



*Product as received*

Water



*Product in water*

Xylene



*Product in xylene*

# 7. Static crude oil removal test

Table 7. Static crude oil removal test results.

| Time (h)    | 0 | 0.5 | 1    | 2  | 6    | 24   |
|-------------|---|-----|------|----|------|------|
| Removal (%) | 0 | 3.3 | 13.3 | 15 | 33.3 | 63.3 |

63.3 %

crude oil removed after 24 hours (static test)

Figure 7. Photographic record of the static crude oil removal test.

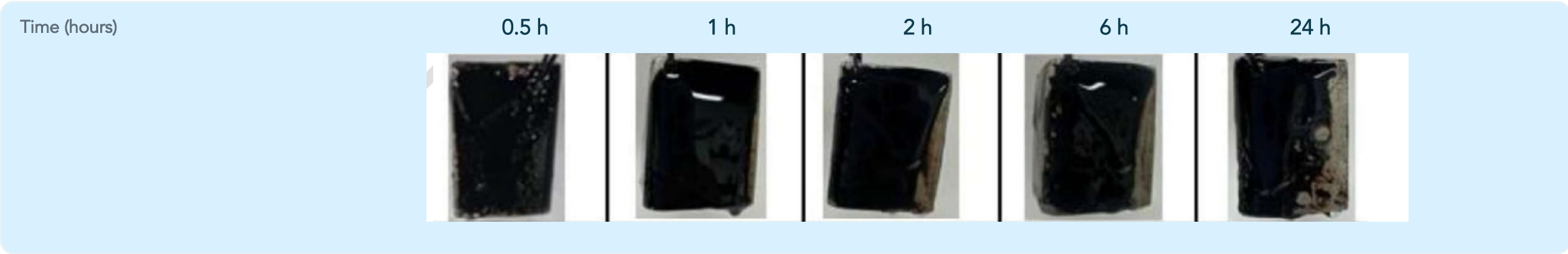
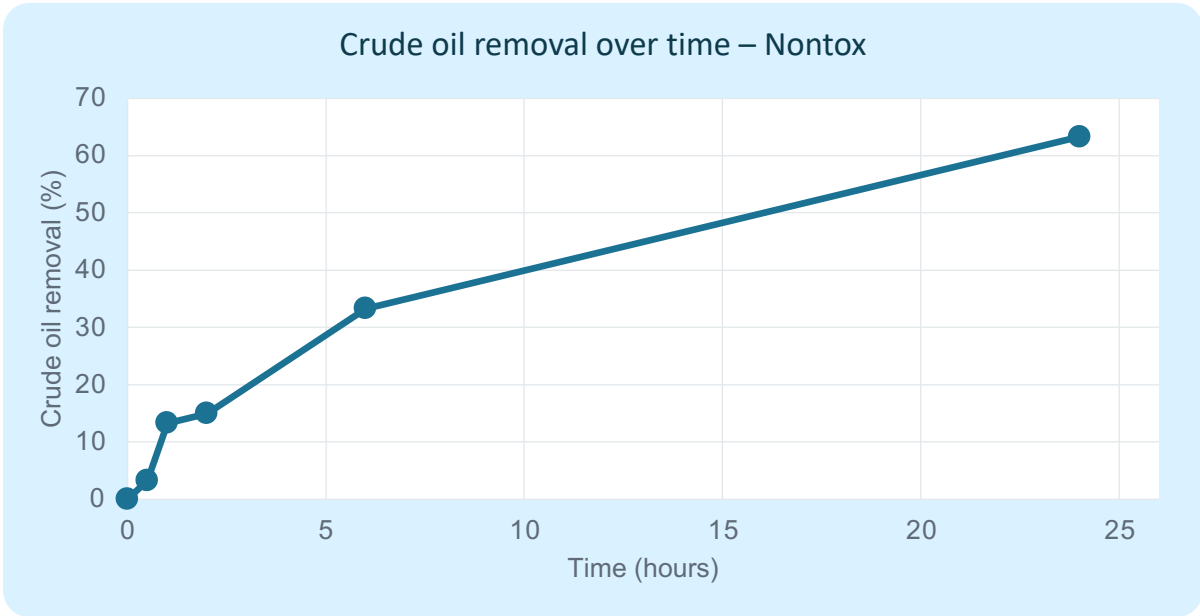


Figure 6. Static crude oil removal test results.



## 8. Dynamic crude oil removal test

Figure 8. Photographic record of the dynamic crude oil removal test.

Adhered crude oil



*Crude oil remaining on the test piece*

Crude oil transferred to the water



*Crude oil released into the aqueous phase*