

APPLICATION NOTE

No. 4.03 PETROCHEMICAL & OFFSHORE

CRUDE OIL IN WATER

- 0 – 10% light crude oil in water
- Real time continuous measurement
- Oil in produced water
- Condensate and cooling water

Crude oil is a yellow-to-black liquid consisting of hydrocarbons of various molecular weights and other liquid organic compounds. Crude oil will not mix with water, however under turbid conditions crude oil will form an oil-in-water emulsion with a turbidity proportional to the oil concentration.

APPLICATION

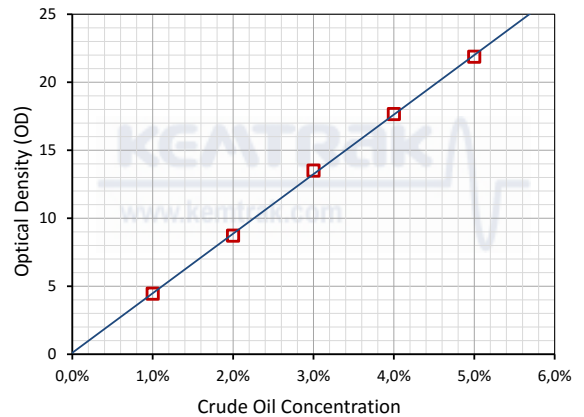
Crude oil in water is accurately measured using a [Kemtrak TC007](#) process turbidimeter. A unique benefit of the [Kemtrak TC007](#) process turbidimeter is that all electronics, including the long life high performance LED light source and photo-detectors, are all housed within the TC007 analyzer enclosure permitting safe operation in even the most hazardous of environments. Industrial grade optic fibers are used to transfer low power cold light from within the TC007 analyzer enclosure to the sampling point and back.

As crude oil will not mix with water, it is essential that the sample under analysis has a turbulent flow to ensure sample homogeneity.



5% light crude oil in water
Left: directly after shaken (turbid flow); Right: after five minutes.

Light Crude Oil in Water

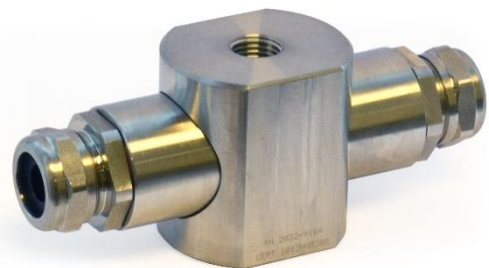


The above calibration was made using light crude oil ($\rho=830 \text{ kg.m}^{-3}$ @15°C, $v=3.51 \text{ mm.s}^{-1}$ @20°C) between 0 – 5% oil in distilled water. The sample was hand shaken (5s) then immediately analyzed.

INSTALLATION

The most critical factor necessary for this analysis is a turbulent flow. It is recommended to use a narrow bore measurement cell and install this on a bypass line where water is available to zero the instrument and flush the cell when not in use. A narrow bore ¼" or ½" NPT thread type measurement cell would be typical for this application.

Under operation the high speed turbulent flow will keep the sapphire windows free from deposits. When not in use the measurement cell should be flushed with water to prevent sticky deposits from accumulating on the optical surfaces.



Kemtrak ¼" NPT industrial fiber optic measurement cell available in 316L, Monel 400, titanium or Hastelloy. Maintenance free with scratch resistant sapphire windows. No electronics or moving parts make the unit a perfect choice for hazardous area use.



Above: Kemtrak TC007 industrial turbidimeter with a DIN DN25 measurement cell

Right: Kemtrak TC007 industrial turbidimeter housed in an ATEX EExD zone 1 explosion proof enclosure

