


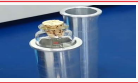





Development of a Standardized Test Method for Determining Quantity of Water and Sediment in Crude Oil on The Field

Jeff Gao^{1,2}, Anthony Schevon¹, Stefan Lim¹, Raj Shah¹

INTRODUCTION

Currently a few laboratory test methods, like Sediment in Crude Oils and Fuel Oils by the Extraction Method (ASTM D473), Water in Crude Oil by Distillation (ASTM D4006), and Potentiometric Karl Fischer Titration (ASTM D4377) are used to determine the contaminants in crude oil. ASTM D96, Standard Test Method for Water and Sediment in Crude Oil by Centrifuge Method (Field Procedure), is meant for onsite usage instead of in a laboratory environment. The K60094 Oil Test Centrifuge is a portable centrifuge designed expressly for petroleum testing applications. This device also contained four centrifuge tubes of either ASTM conical type (6 or 8"), pear shaped (100 mL), or finger tube (12.5 mL).

PROCEDURE

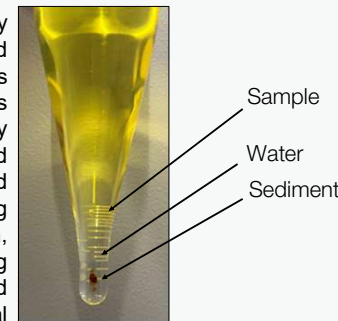
-  Fill each of the centrifuge tubes to exactly the 50-mL (100-part) mark with the test sample and each tube with solvent to exactly the 100-mL (200-part) mark.
-  Cork or stopper the tube.
-  Place centrifuge tubes into the preheated centrifuge tube holders and heat contents of the tubes to 60°C ± 3°C. Place load filled tubes into the tube holders.
-  Check that the Motor dial is set to the minimum value and turn on the power afterwards.
-  Turn the motor speed dial clockwise to a speed setting that produces a RCF of 500 and spin it for 5 minutes.
-  Verify the temperature isn't below 52°C
-  Record the combined volume of sediment and water at the bottom of each tube.

TEST METHOD

This test method covers the centrifuge method for determining sediment and water in crude oil during field custody transfers. This test method may not always provide the most accurate results, but it is considered the most practical method for field determination of sediment and water. Known volumes of crude oil and solvent are placed in a centrifuge tube and heated to 60°C ± 3°C. After centrifugation, the volume of the sediment-and-water layer at the bottom of the tube is read.

VERSATILITY

Koehler's K60094 offers great versatility by providing insights into the overall quality and stability of various petroleum products. This versatility is particularly valuable in industries such as oil refining, fuel production, and quality control, as it allows for accurate assessment and monitoring of the purity and performance of liquid substances. The centrifuge aids in identifying potential issues like contamination, sedimentation, and water content, ensuring compliance with industry standards and facilitating informed decision-making for optimal product quality.



Along with the instrument, Koehler offers several types of centrifuge tubes. Long tubes are the most common and separate particles based on size and density. The elongated shape allows for increased surface area, enabling efficient separation of components within the sample. Cone tubes are specifically designed for the separation of heavier particles or solids from lighter samples. The tapered shape facilitates efficient separation, as the heavier particles are driven to the bottom of the cone, while the lighter liquids remain at the top. Lastly, pear tubes are primarily employed for separation of immiscible liquids and clarifying or purifying liquids by removing suspended solids or impurities.



CONCLUSION

The K60094 provides a convenient means of determining sediment and water content in crude oil, fuel oils, middle distillate fuels, and biodiesel. With features such as integrated tube holder, pre-heater, and timer, switchable temperature display between °C and °F, and opening in top lid for speed calibration by portable laser tachometer this instrument is one of the best of its kind. This instrument allows for massive time saving in centrifugation testing.

REFERENCES

Standard Test Methods for Water and Sediment in Crude Oil by Centrifuge Method (field procedure) (withdrawn 2000). ASTM International - Standards Worldwide Available at: <https://www.astm.org/standards/d96>. (Accessed: 5th January 2023)
Koehler Instrument Company, Inc., (2022) Portable Heated Oil Centrifuge - Operation Manual, Holtsville, NY: Koehler Instrument Company

1: Koehler Instrument Company, Inc., Holtsville, NY 11742, USA

2: Department of Materials Science and Chemical Engineering, Stony Brook University, Stony Brook, NY 11794, USA