

Thermo. Titr. Application Note No. H-022

Title: Determination of Moisture in Lubricating Oils with TEOF

Scope: Determination of moisture in lubricating oils with TEOF (triethyl orthoformate)

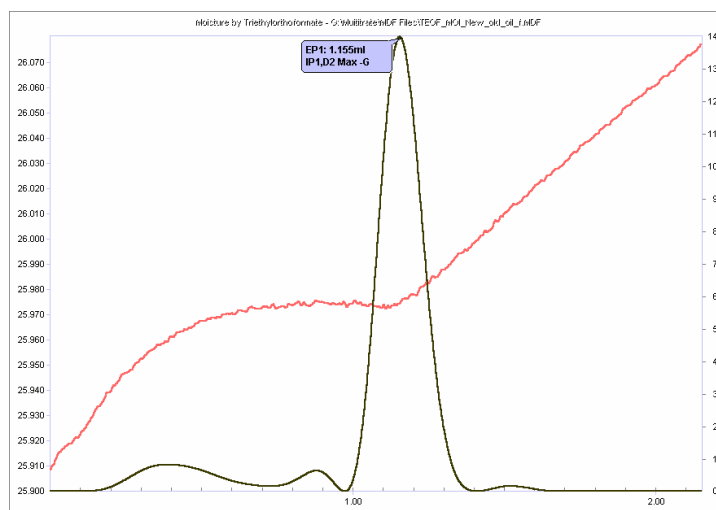
Principle: A sample of oil is dissolved in a solvent mixture containing an acid catalyst, and titrated with a solution of triethyl orthoformate in cyclohexane to an endothermic endpoint.

$$HC(OCH_2CH_3)_3 + H_2O \xrightarrow{H^+} HCOOCH_2CH_3 + 2CH_3CH_2OH$$

Reagents: 1.2 mol/L triethyl orthoformate (TEOF)(CAS 122-51-0, Riedel de Haën cat. No. 60388, M=148.20, d=0.89, purity=99%) in dry (HPLC grade) cyclohexane. Pipette 200mL TEOF into a 1000mL volumetric flask, and make to volume with cyclohexane. (Burette #1)

Solvent mixture. Mix 800mL dry (HPLC grade) cyclohexane, 150mL dry (HPLC grade) iso-propanol, 100mL dry chloroform, and 20mL methane sulfonic acid 99.5%+ (CAS 75-75-2, Aldrich cat. no. 471356) and store in a tightly stoppered bottle. (Burette #2) This mixture is hygroscopic, and must be protected from atmospheric moisture

Thermometric Titration Plot:



Legend:

Red = direct temperature curve

Black = second derivative