Water Determination in Biodiesel Samples by Karl-Fischer Titration

Elvan Ertürk¹, Nihan Koyuncu¹, Ümran Seven², and Şeref Güçer¹,²
¹ The Scientific and Technological Research Council of Turkey (TÜBİTAK) Bursa Test and Analysis Laboratory (BUTAL), 16190, Bursa, Turkey, elvan.erturk@tubitak.gov.tr
² Uludağ University, Faculty of Arts & Science, Chemistry Department, 16059, Bursa, Turkey

The Karl Fischer titration (KFT) is a chemically selective method for determining water content in different matrices [1]. Because of corrosion properties of water content the permitted water concentration was limited as a level of 500 mg/kg in biodiesel samples according to EN 14213, and EN 14214 standards.

Karl Fischer titration is one of the important methods which is used oxidation of sulphur dioxide by iodine according to following reaction described by Bunsen:

\[ \text{I}_2 + \text{SO}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{HI} + \text{H}_2\text{SO}_4 \]

Depending on the matrix condition some compounds cause side reactions leading to erroneous results.

Coulometric Karl Fischer titration is a useful technique for wide-range water determination, from the percentage level down to trace amounts at the ppm level [2]. In our study water determination methods were established with KFT system using coulometric technique. Biodiesel samples were used in order to show some matrix effects for water determination. Certified reference materials were used for the accuracy of results. Analytical range was 60 to 1000 mg/kg. Limit of detection and limit of quantitation were determined 20 mg/kg and 60 mg/kg, respectively.

References