Base Number Titration of Crude Oil Samples

Tianguang Fan
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Experimental Materials

Electrode: Orion model 81-02 Combination pH electrode with filling solution of saturated NaClO₄ in Isopropanol
Titrant: 5ml 70% HClO₄, 15ml (CH₃CO)₂O dilute to 1000ml with glacial HAc
Spiking sol’n: ~ 0.5g Quinoline dilute to 100ml with Decane
Standard sol’n: ~0.2g KHP dilute to 250ml with HAc

Titration Procedures

a) Orion model 520A pH meter calibration with pH 4 and 7 buffers
b) Set the Brinkmann Buret/Dispenser 350 at DISC C mode with titration rate 0.4-0.6 ml/min
c) Titrant standardization with 50ml KHP standard solution
d) 1ml spiking solution in 50ml MIBK solvent titration with standardized titrant
e) 1ml crude oil in 50 MIBK solvent, spiked with 1ml spiking solution titration with standardized titrant

Calculations

The molarity concentration of titrant (N) is calculated as such:

\[ N = 1000 \times \frac{W_{KHP}}{(204.23 \times V_{eq})} \]

in which, \( W_{KHP} \) is the amount (g) of KHP in 50ml of KHP standard solution, and \( V_{eq} \) is the amount of titrant (ml) consumed by 50ml KHP standard solution at the equivalent point.

The base number (BN) of a crude oil sample, in terms of mg KOH/g oil, is calculated as such:

\[ BN = (V_{eq}-b_{eq}) \times N \times 56.1 / W_{oil} \]

in which, \( V_{eq} \) is the amount of titrant (ml) consumed by crude oil sample and spiking solution at the equivalent point, and \( b_{eq} \) is the amount of titrant (ml) consumed by 1ml spiking solution at the equivalent point.