Acid Number Titration of Crude Oil Samples
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Experimental Materials

Electrodes: Orion model 81-02 glass combination pH electrode
Filling solution: saturated LiCl in ethanol solution
Titrant: 0.05M tetrabutyl ammonium hydroxide in ethanol (or methanol)
Spiking solution: ~ 0.5g stearic acid diluted to 100ml with acid titration solvent or decane
Standard solution: ~0.2g KHP dilute to 500ml with DI water
Titration solvent: 6ml DI water & 494ml HPLC grade 2-propanol & 500ml HPLC grade toluene

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 titration solvent titration with standardized titrant
e)   ~ 1ml crude oil (or less if solubility is limited) in 50 titration solvent, spiked with 1ml spiking solution titration with standardized titrant

Calculations

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

$$N = 1000 \times W_{KHP}/(204.23 \times V_{eq,std})$$

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

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

$$AN = (V_{eq} - b_{eq}) \times N \times 56.1/ W_{oil}$$

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