



Application Note

Mercaptan sulfur of petroleum products

Industry	:	Petroleum
Instrument	:	Automatic potentiometric titrator
Measurement method	:	Potentiometric titration / Precipitation titration
Standards	:	UOP Method 163, SN/T 4951

Mercaptan sulfur in test samples were measured based on “UOP Method 163 Hydrogen Sulfide and Mercaptan Sulfur in Liquid Hydrocarbons by Potentiometric Titration”. Test samples were prepared to almost 100 ppm and 1 ppm by dissolving octanethiol in toluene.

A test sample and concentrated ammonia solution were dissolved in 2-propanol, and then the solution was potentiometrically titrated with silver nitrate 2-propanol solution. An inflection point on the titration curve was regarded as the endpoint. The quantity of mercaptan sulfur was calculated from the volume of silver nitrate 2-propanol solution used to titrate sample to endpoint.

- 1) Handle the reagents in a well ventilated room or a draft chamber.
- 2) Rinse electrodes with suitable solvent and then pure water after each measurement.
- 3) Immerse the silver/silver-sulfide electrode into 100 mL of titration solvent containing 0.5 mL of 0.1 mol/L silver nitrate solution for 5 minutes, after washing electrodes.
- 4) Prepare silver sulfide coating on the surface of silver electrode again by the method described in “6. Procedure, -Preparation of silver/silver-sulfide electrode-“, when the coating becomes rough or the titration curves become noisy.
- 5) 0.1 mol/L silver nitrate 2-propanol solution is standardized at an interval not shorter than the concentration changes by more than 0.0005 mol/L.

- 1) Clean the glass electrode with alcohol and keep lower half of the electrode immersed in water.
- 2) Clean the silver electrode with alcohol and wipe. Then, keep in a dry condition.

Main unit : Automatic potentiometric titrator (preamplifier : STD)
Electrode : Silver electrode (with silver sulfide coating)
pH glass electrode

0.1 mol/L silver nitrate solution

0.01 mol/L silver nitrate 2-propanol solution

Prepare this solution daily by diluting 0.1 mol/L silver nitrate solution with 2-propanol.

0.001 mol/L silver nitrate 2-propanol solution

Prepare this solution daily by diluting 0.01 mol/L silver nitrate solution with 2-propanol.

Concentrated ammonia solution (28%)

1% sodium sulfide (Na₂S) solution

Dissolve 1 g of a ^ S Di 卄 o Mn
P l

-Preparation of silver/silver-sulfide electrode-

- 1) Burnish detection part of electrode with polishing paper included with the product.
 - 2) Wash the electrode with pure water and wipe dry.
 - 2) Immerse the electrode in mixture of 96 mL of 2-propanol, 1 mL of concentrated ammonia solution and 8 mL of 1% Na₂S solution, and heat the mixture to 60°C*.
 - 3) Keep the temperature of the solvent at 60°C * and add 10 mL of 0.01 mol/L silver nitrate 2-propanol solution for 10 minutes with stirring.
 - 4) Wash the electrode with water and wipe off surplus silver sulfide.
- *Though heating operation is not described in the standard, good silver sulfide coating is formed by this operation.

-Measurement of 100 ppm sample-

- 1) Add 100 mL of 2-propanol into a 200mL tall beaker.
- 2) Add approximately 1 mL of concentrated ammonia solution.
- 3) Add approximately 50 g of sample and measure mass of it to the nearest 0.1 mg.
- 4) Titrate with 0.01 mol/L silver nitrate 2-propanol solution.

-Measurement of 1 ppm sample-

- 1) Add 150 mL of 2-propanol into a 300mL tall beaker.
- 2) Add approximately 1 mL of concentrated ammonia solution.
- 3) Add approximately 100 g of sample and measure mass of it to the nearest 0.1 mg.
- 4) Titrate with 0.001 mol/L silver nitrate 2-propanol solution.

$$\text{Mercaptan sulfur (mass-ppm)} = \frac{\text{EP1} \times \text{TF} \times \text{C}}{\text{I} \times \text{t} \times \text{E} \times \text{w} \times \text{n} \times \text{c}}$$

-Results-

100 ppm Sample

Results		
Mass of sample (g)	Titer (mL)	Mercaptan sulfur

1 ppm Sample

Two test samples were measured three times respectively, and the results of them showed a good repeatability.

In some samples, verification of the measurement capability is required. In such case, please contact us.

- 1) UOP Method 163-10 Hydrogen Sulfide and Mercaptan Sulfur in Liquid Hydrocarbons by Potentiometric Titration