# NIST  No. 2721 (Crude Oil (Light-Sour))

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| Sheet No.: | **NSX2100H-PE-011E** | | Petroleum chemistry |
| Measurement model: | **TS-2100H System** | Relevant standard: | ASTM D5453 |
| | **ABC-210/HF-210/SD-210** | | JIS K 2541 |
| Detection method: | Ultraviolet Fluorescence method | | |

The raw petroleum is purified by distillation or catalyst to become various raw materials of petroleum products. The necessary amount of desulfurization catalyst can be decided by controlling the concentration of sulfur in each purification process and the extraction rate can be considerably improved. The sulfur analysis device (**TS-2100H**) of Mitsubishi Chemical Analytech Co., Ltd. can analyze the sulfur in raw petroleum quickly with accuracy.

| Sample name | Crude Oil (Light-Sour) |
|---|---|
| Analytical item | Quantitative analysis of sulfur in combustion method |
| Standard | **ASTM-D5453**: standard testing method for measuring sulfur contained in carbon hydride and fuel using an ultraviolet fluorescence detector<br>**JIS K 2541**: raw petroleum and petroleum product – sulfur content testing method – ultraviolet fluorescence method |
| Analytical principle | Ultraviolet fluorescence method: Sample is burned in argon / oxygen stream and the generated sulfur dioxide is introduced to the cell of ultraviolet irradiation. The fluorescence intensity generated by ultraviolet irradiation is measured and the amount of sulfur is calculated based on the standard curve that has been created using the standard sulfur sample.<br><br>$Organic\text{-}S + O_2 \rightarrow SO_2 + CO_2$    (combustion)<br>$SO_2 + hv \rightarrow SO_2 + hv_2$    (ultraviolet fluorescence) |

| Result of sulfur analysis<br><br>Horizontal combustion method | | | | | | |
|---|---|---|---|---|---|---|
| | Sample name | **TS-2100H**   analysis value (S %) | | | | |
| | | 1 | 2 | 3 | **Average** | RSD (%) |
| | Crude Oil (Light-Sour) | 1.552 | 1.567 | 1.565 | **1.561** | 0.49 |

| Required analysis time<br><br>Horizontal type | Pretreatment (---) minutes, Measurement ( 9) minutes<br>Total ( 9) minutes/ (1)measurement |
|---|---|

*This sheet is provided as a reference and does not guarantee analytical values. Optimal conditions may vary depending on external factors, such as the analysis environment, and the nature of the sample.

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## Conditions of sulfur analysis

## Horizontal combustion method

**Measurement condition**

Reaction tube ... double tube for ABC
Temperature of electric furnace
   Inlet Temp   800°C
   Outlet Temp   1,000°C
   PMT Range   Low (for High concentration)

**Gas flow rate**

Ar.................. 300mL/min
$O_2$ ................. 300mL/min

**[ABC program]**

| Sample name | 1st | | 2nd | | 3rd | | End Time (sec) | Cool Time (sec) | Delay Time (sec) |
|---|---|---|---|---|---|---|---|---|---|
| | Pos (mm) | Time (sec) | Pos (mm) | Time (sec) | Pos (mm) | Time (sec) | | | |
| Lubrication oil | 90 | 10 | 105 | 90 | 115 | 20 | 100 | 60 | 180 |

Boat  Speed: 20mm/sec     Ar  Time: 10sec     $O_2$  Time (sec): 600sec

Standard sample for standard curve: S_Dibutyl disulfide / toluene
                               0, 10, 50, 100µg/mL $\times$ 20µL
Amount of introduced sample:  20µL

- For the sample for measurement, the sample diluted to 0.25% with toluene was used. The obtained measurement value multiplied by dilution rate was set to the sulfur quantitative value.