

**NIST No. 1619b (Sulfur in Residual Fuel Oil (0.7%))**

Sheet No.: **NSX2100H-PE-005E** 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 fuel oil residue is purified using catalyzer for reuse. If the amount of sulfur in this fuel oil residue can be analyzed with accuracy, the devulcanization can be efficiently carried out using the proper amount of catalyzer. The sulfur analysis device (**TS-2100H**) of Mitsubishi Chemical Analytech Co., Ltd. can analyze the sulfur in fuel oil residue quickly with accuracy.

Sample name	Sulfur in Residual Fuel Oil (0.7%)																					
Analytical item	Quantitative analysis of sulfur in combustion method																					
Standard	<b>ASTM-D5453</b> : standard testing method for measuring sulfur contained in carbon hydride and fuel using an ultraviolet fluorescence detector <b>JIS K 2541</b> : 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.  $\text{Organic-S} + \text{O}_2 \rightarrow \text{SO}_2 + \text{CO}_2$ (combustion) $\text{SO}_2 + \text{h}\nu \rightarrow \text{SO}_2 + \text{h}\nu_2$ (ultraviolet fluorescence)																					
Result of sulfur analysis	<table border="1"> <thead> <tr> <th rowspan="2">Sample name</th><th colspan="5">TS-2100H analysis value (S %)</th></tr> <tr> <th>1</th><th>2</th><th>3</th><th>Average</th><th>RSD (%)</th></tr> </thead> <tbody> <tr> <td>Sulfur in Residual Fuel Oil (0.7%)</td><td>0.672</td><td>0.668</td><td>0.666</td><td><b>0.669</b></td><td>0.47</td></tr> </tbody> </table>					Sample name	TS-2100H analysis value (S %)					1	2	3	Average	RSD (%)	Sulfur in Residual Fuel Oil (0.7%)	0.672	0.668	0.666	<b>0.669</b>	0.47
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Sulfur in Residual Fuel Oil (0.7%)	0.672	0.668	0.666	<b>0.669</b>	0.47																	
Horizontal combustion method																						
Required analysis time	Pretreatment (---) minutes, Measurement ( 9 ) minutes																					
Horizontal type	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.

Conditions of sulfur analysis  Horizontal combustion method	<b>Measurement condition</b>				<b>Gas flow rate</b>					
	Reaction tube ... double tube for ABC				Ar..... 300mL/min					
	Temperature of electric furnace				O <sub>2</sub> ..... 300mL/min					
	Inlet Temp 800°C									
	Outlet Temp 1,000°C									
	PMT Range Low (for High concentration)									
	<b>[ABC program]</b>									
	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 <sub>2</sub> Time (sec): 600sec									
	Standard sample for standard curve: S_Dibutyl disulfide / toluene 0, 10, 50, 100µg/mL × 20µL									
	Amount of introduced sample: 20µL									
	- For the sample for measurement, the sample diluted to 1% with toluene was used. The obtained measurement value multiplied by dilution rate was set to the sulfur quantitative value.									