

Full-Automatic Asphaltene Analyzer

Model APD-600A

Conforming to the "JPI-5S-45-95" test method
of Japan Petroleum Institute

**Advanced
Technology
Prize**
was awarded by
the Japan
Petroleum
Institute.



Asphaltene concentration largely affects burning characteristics of heavy oil, and its analysis is becoming more important now from a viewpoint of the global environment. Introduction of Asphaltene Analyzer is nowadays studied not only by petroleum industries but also by thermal power plants, boiler facilities, ship-building industries, ocean vessels, port and harbor authorities, etc. More than 200 sets have been already introduced to the Japanese domestic major oil refineries, petrochemical manufacturers as well as overseas leading petroleum companies, laboratories and universities, etc. until now. The worldwide oil resource development will further step forward to the direction of heavy crude oil, shale oil and oil sand from the conventional production and consumption of light crude oil, thus the Asphaltene Analysis will become further important and needed.

CONTENTS

Brief Overview	p.2
Characteristics	p.2
Method of Pretreatment/ Measuring Principle ...	p.3
Specifications	p.4
Contact	p.4

Asphaltene Analyzer Model APD-600A

using a Dual Wavelength Spectrophotometric Method

Upgraded from the conventional Model APD-500A, with the same functions and improved performance

Brief Overview

There are two methods of ASTM D3279 and ASTM D6560 (equivalent to IP 143) in the Asphaltene Testing Methods for crude oil and petroleum oil. Both methods are conducted by manual gravimetric technique in filtration process using the specified solvent to calculate Asphaltene concentration. It will take half a day to a full one day to make this analysis, with such disadvantage as measured data will widely vary. Using this Asphaltene Analyzer, measurement is done in about one minute, except the time for sample pretreatment, with much less variation of measured data, so many sets of this analyzer have been introduced to many Japanese oil companies until now. From the said background, this dual wavelength spectrophotometric method was formalized in 1995 for Asphaltene analysis as the authorized method of "JPI-5S-45-95" by the Japan Petroleum Institute (JPI). When using this Asphaltene Analyzer, the measurement values are automatically calculated as the values of ASTM D3279 method, which has less data variation compared with the values of ASTM D6560 (or IP 143).

*When this Asphaltene analysis method was formalized by the JPI, careful study on the measurement values of ASTM D3279 and ASTM D6560 (or IP 143) was done, and it was proved as a result that there was quite good correlation on the measurement values of the both methods.

*A user of this analyzer can optionally set a correlation formula even to automatically obtain the values of ASTM D6560 (or IP 143) in addition to the conventional measurement values. User's own specific correlation formula can also be set if necessary.

- Before the shipment from the factory, 0-100% calibration is done using the Asphaltene standard liquid (APD-006), and the working curve is made and saved into the built-in memory. So, after a user's installation, the analyzer can be used immediately by doing the 0-100% calibration only.
- By setting on the turn-table your samples that have been pretreated according to the method specified by the JPI, automatic measurements will be done just by starting the operation.
- Samples for measurements are stirred by stirrer rotors, and sucked into the measuring cell by a tubing pump.
- Absorbency of the sucked samples is measured, and Asphaltene concentration is calculated, then the results are printed out.
- A sequence of this operation is automatically done for all the samples set on the turn-table.

Characteristics of Model APD-600A

Very rapid

Measurement is made in about 1 minute except a pretreatment of samples.

No specific skill

Everyone can make measurements by a simple pretreatment of samples.

Wide variety of oils

Measurement is applicable not only to fuel oils but also to base oils, cracked residue, etc.

High accuracy

This analyzer has excellent repeatability without dependence on operators.

Automatic generation of working curve

No complicated calculation is required to make a working curve.

All-in-one type

Measuring section and sample changer turntable are integrated into one unit.

LED lamps as a light source

A considerably long period of stable use is now possible.

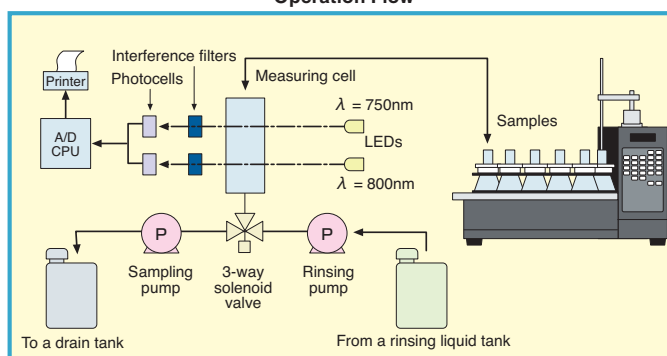
Complete supply as standard equipment

This analyzer is supplied as a complete set ready for immediate use.

Compatibility with ASTM and IP methods

The measured results have good correlations with those of ASTM D3279/D6560 and IP 143 methods, which are internationally well known and applied by many users.

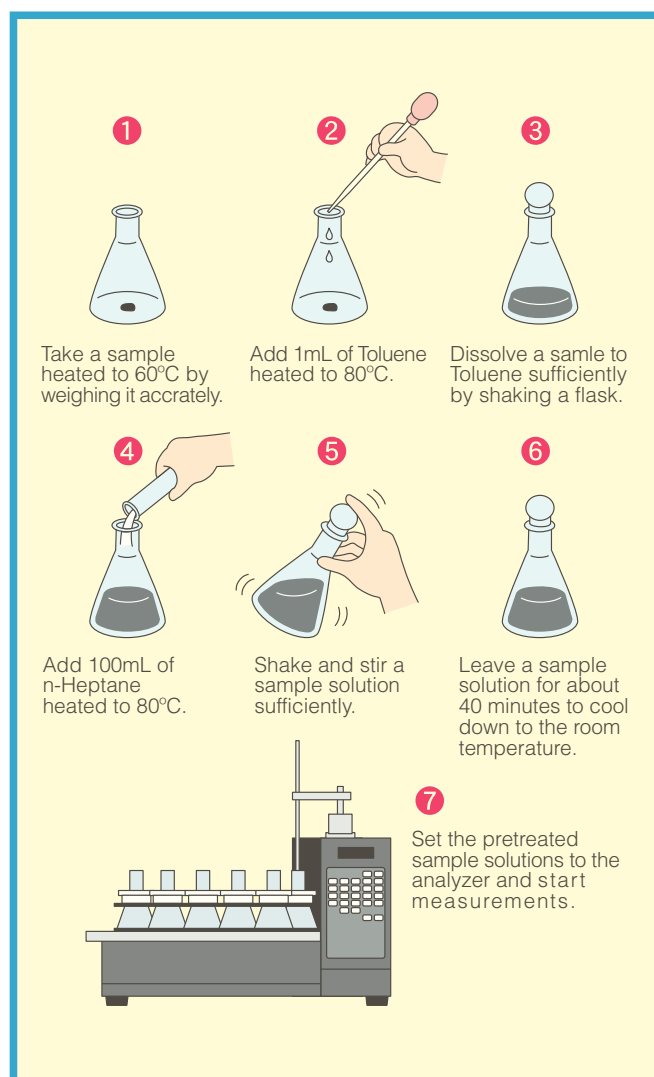
Operation Flow



Method of Pretreatment

For this Asphaltene analysis using the APD-600A, samples for measurements must be pretreated according to the test method of "JPI-5S-45-95" specified by the Japan Petroleum Institute (JPI). To do this operation of pretreatment, the following equipment will be needed to be prepared at the place of measurements, together with Toluene and n-Heptane.

- Analytical balance
(Measurable with the minimum reading of 0.0001g)
- Constant temperature chamber
(With the temperature control of 60°C to 80°C)
- Water bath
(With the temperature control of 80°C to 100°C)
- Fume hood
(Draft chamber, exhaust hood, etc.)
- Nitrogen gas for purging
(Needed to keep the Asphaltene standard liquid inoxidizable for use)
- Laboratory glassware, etc.
(500mL measuring flask, 100mL measuring cylinder, 1mL measuring pipette, disposable pipette (about 1mL), etc.)

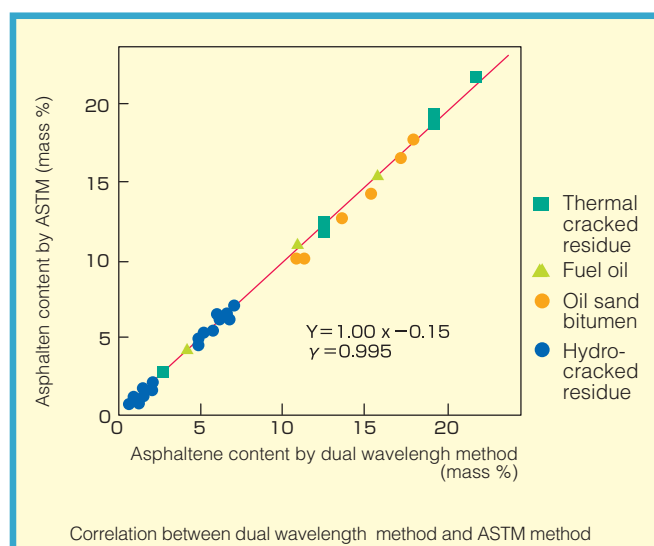


Method of Pretreatment

Measuring Principle

A sample is dissolved by adding 1mL of Toluene, and n-Heptane heated to 80°C is added to disperse Asphaltene particles. Absorbency of this sample solution with dispersed Asphaltene particles is measured at 750nm and 800nm to obtain the ratio of the 2 wavelengths. The Asphaltene concentration is then determined from the built-in working curve and the sample's weight. To catch the absorbency of just the light scattered by Asphaltene particles in the sample solution, very unique calculation formula has been established by focusing attention on the ratio of the 2 wavelengths.

The values as a result of measurements have very good correlation with the measurement values under the ASTM D3279 method, and it is also possible to output the measurement values under the IP 143 method (or ASTM D6560 method) by inputting certain coefficient.



Graph of Correlation

Specifications of Model APD-600A

●System Configuration

The following three units are integrated into this analyzer.

- (1) Measuring and calculating unit, including control amplifier and operation panel
- (2) Absorbency measuring unit, including LED lamps and silicon photocells
- (3) Sample-changer unit (turn-table type), for max. 12 samples

<Note> A printer for this analyzer is of external connection type, so two AC outlets will be needed for connection with the analyzer and printer.

●Specifications

1	Model name	APD-600A, Full-automatic Asphaltene Analyzer
2	Measuring objects	Crude oil, heavy oil, cracked residue (normal pressure or reduced pressure), asphalt, various types of cracked oils, shale oil and oil sand: However, measurement by the APD-600A is not available for the samples containing Toluene insoluble components such as sludge, the samples containing a large amount of wax with a pour point of 50°C or higher, and blown asphalt.
3	Number of samples for measurement	Max. 12 samples (*Measuring conditions are settable for max. 24 samples.)
4	Measuring method	Conforming to the JPI-5S-45-95 test method Absorption spectroscopy (Wavelength $\lambda=750$ & 800 nm) a) Light source: LED lamps b) Photo sensor: Silicon photocells
5	Measuring range	0.5 to 15 wt%
6	Reproducibility	[Absorbency accuracy of soluble matter] $\pm 2\%$ (in the vicinity of Abs. 2.5, when converted to 10mm cell)
7	Output of results	Display (fluorescent character display: 16 digits x 2 lines) and Printer (IDP-100, for external connection)
8	Display unit	Abs * *** (3 digits after the decimal point) and ****mV (4 digits)
9	Sampling	Automatic sampling by tubing pump
10	Cleaning method	Rinse by tubing pump
11	Sequence	Seq-1: Measurement only Seq-2: Measurement and rinse Seq-3: Sequence to make a working curve
12	Measuring time	Approx. 1 minute per sample (for absorbency measurement only)
13	Function	Re-calculation Automatic statistical calculation Calendar
14	External output	Printer port x 1 and Serial port x 1

15	Environment for use	Temperature 5 to 35°C and Humidity 85%RH or less (no condensation)
16	Power supply	100 to 240V AC +/-10%, 50/60Hz
17	Weight	Approx. 20kg
18	Dimensions	520(W) x 428(D) x 350(H) mm (excluding drain and rinsing liquid tanks)

●Results of measurements

To be output to an external printer or output via RS-232C interface

●Standard accessories

The following accessories and consumables are supplied together with the APD-600A.

Printer (for plain paper)	1 set
Printer paper	4 rolls
Ink cartridge	5 pieces
Power cable	1 piece
Tank (for drain and rinsing liquid)	2 pieces
Erlenmeyer flask (with plug)	12 pieces
Flask holder	12 pieces
Stirrer rotor	12 pieces
Standard Asphaltene liquid (for calibration)	1 bottle
Operation manual	1 copy

●Option

The following software is available in option for output of measurement results to PC.

Soft-CapE / RS-232C cable

●Remarks

Measuring method is based on the "JPI-5S-45-95" test method of the Japan Petroleum Institute.

Prepare Toluene (grade of reagent, 99.5% or higher purity) and n-Heptane (grade of reagent, 99% or higher purity) for this Asphaltene analysis.

To obtain good results of measurements, it is very important to pay attention to the weights of samples you will take and the control of temperature and time for sample pretreatment.

Conforming to CE

For more information, please contact:

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