Complementary Information on Asphaltene Analysis

1. Introduction

As the method to analyze asphaltene, there are two well-known testing methods of "IP 143" and "ASTM D3279". Both of these methods have complicated process, and an easier and more simplified method was being sought by organizations doing asphaltene analysis.

2. About accuracy

(1) Accuracy of the said official testing methods

    1) IP 143

- Allowed repeatability : 10% of average value
- Allowed reproducibility : 20% of average value

    2) ASTM D3279

Asphaltene	Allowed repeatability	Allowed reproducibility
Less than 1	0.05	0.10
More than 1	5% of average value	10% of average value

    3) Reproducibility of APD-500A and correlation

From its operational method, the values measured by APD-500A will be equivalent to the values measured under the testing method of ASTM D3279. So, the comparison was done against the values measured under the testing method of IP 143 by Japanese oil companies, the result of which was as in the following table.

Sample	Tested places	1	2	3	4	5	6	7	8	9	10	Average	Difference
Sample A	APD-500A	1.58	1.40	1.22	1.44	1.72	1.48	1.36	1.52	1.13	1.40	1.43	0.59
	IP 143	1.14	1.15	0.98	1.40	1.03	0.87	1.15	1.08	0.97	1.02	1.08	0.53
Sample B	APD-500A	8.74	7.87	7.45	7.48	7.39	8.84	8.22	7.28	7.04	7.39	7.78	1.80
	IP 143	7.95	8.95	7.73	9.21	7.71	8.82	7.63	7.35	7.50	8.23	8.11	1.71
Sample C	APD-500A	13.1	11.9	13	12.4	11.8	12.0	13.7	10.9	12.0	11.9	12.3	2.8
	IP 143	12.8	14.5	12.9	14.1	13.4	13.0	12.5	11.9	12.4	13.9	13.1	2.6

As a result, it was turned out that the reproducibility of APD-500A is equivalent to that of IP 143 method, and the values measured by APD-500A are correlating to the values measured by the IP 143 method under the formula of "Y = 1.085X – 0.62".

    4) Repeatability of APD-500A

Tests to seek for repeatability of APD-500A were done by several oil companies in Japan. As a result, APD-500A marked the better deviation value of repeated average measurements against the values measured under the ASTM D3279 method.

Tested places	Sample A		Sample D		Sample B		Sample C	
	1	2	1	2	1	2	1	2
1	1.07	1.05	3.42	3.45	8.38	8.54	13.1	13.0
2	0.94	0.99	3.07	3.39	7.52	7.12	11.4	10.9
3	0.94	0.87	3.00	3.08	8.37	8.2	14.2	12.9
4	0.90	0.93	2.86	2.87	8.15	8.17	12.3	12.3
5	1.00	1.01	3.14	3.29	6.12	7.34	12.4	13.1
6	1.01	0.90	3.21	3.52	7.81	8.21	12.3	12.3
7	0.97	1.00	3.29	3.26	7.73	7.81	12.5	13.0
8	0.93	0.91	2.96	3.04	7.32	7.49	11.8	12.0
9	0.95	0.99	3.17	3.25	7.29	7.73	11.9	12.4
10	0.99	1.04	3.26	3.19	7.97	7.73	11.6	12.3
Ave. deviation	0.03		0.12		0.33		0.45	

3. For introduction of APD-500A newly

In general, the accuracy of asphaltene analysis is not so good as you see above. The measured data will also fluctuate somehow depending on the organizations doing the analyses. Therefore, when introducing the APD-500A newly, it is suggested that you will grasp well the difference and correlation between the data measured and accumulated until now by your organization and the ones measured by APD-500A, and adequate compensation will be required so as to get the better result of the correlated values. In the mean time, the APD-500A's accuracy of repeatability should be in general equal to or better than that of the ASTM method.

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<Remarks>

1) Repeatability : (Parallel accuracy inside the same room)
   It indicates a range of fluctuation of the values measured by the same person using the same instrument.

2) Reproducibility : (Reproduced accuracy between the different rooms)
   It indicates a range of fluctuation of the values measured by different persons using different models of the same type of instruments.