

**ACTION RESEARCH PROJECT ON DIFFERENTIATION OF
PETROLEUM HYDROCARBON SOLVENT, 120/240 (IS 1745) AND
KEROSENE (IS 1459)**

by

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Introduction

BIS has published IS 1459 : 2018 Kerosene – Specification (*fourth revision*) and IS 1745 : 2018 Petroleum hydrocarbon solvents- Specification (*third revision*). IS 1459 prescribes requirements and methods of sampling and test of Kerosene intended for use as an illuminant and as a fuel and IS 1745 prescribes the requirements and the methods of test for Petroleum Hydrocarbon Solvents generally used in solvent extraction of oils, rubber and paint industries, in the formulation of insecticides, for dry cleaning and for textile printing purposes.

BIS receives queries from importers regarding overlapping of final boiling point of hydrocarbon solvent (120/240), with kerosene and their product being considered as kerosene as the parameters of solvent is qualifying with that of kerosene, by Customs authorities. The issue was discussed in a recent meeting of Petroleum and their relevant products of synthesis or biological origin Sectional Committee, PCD3, also. The Committee opined that a policy should be framed by concerned regulatory authorities, as the petroleum products are hydrocarbons and cannot be differentiated through compositional characteristics.

It is observed from the standards that

- (i) The requirements specifically prescribed in IS 1459 for Kerosene only are a) Acidity, inorganic; b) Burning quality; and c) Smoke point and that in IS 1745 Petroleum Hydrocarbon Solvents are a) Initial boiling point; b) Aromatic content; and c) Residue on evaporation.
- (ii) The requirements of Colour by saybolt, Copper strip corrosion, Density, Flash point and Final boiling point and Sulphur content with different values/limits are prescribed in both the standards.
- (iii) In case of final boiling point of solvent is 220°C or above, Customs Authorities are testing the samples for kerosene, and if it passes in smoke point, then they state the product as kerosene and not solvent. Since there is import ban on kerosene, it is not possible to import such product. Hence, importers are writing to BIS to define their product.
- (iv) Further, experts of the Committee states that some importers, import solvent with 220-240°C FBP and adulterate kerosene.

Member Secretary's Observation:

It is observed that in the IS 1745 the requirement of Distillation range for solvents is given as under:

SL No.	CHARACTERISTIC	Solvent 60/80	Solvent 50/120	Solvent 90/135	Solvent 125/240	Solvent 145/205 Low Aromatic	Solvent 145/205 High Aromatic	Solvent 150/300	Method of Test [Ref to (P :) of IS: 1448
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
v)	<i>Distillation range</i>								<i>P: 18</i>
	a) <i>Initial boiling point, Min</i>	60°C	50°C	90°C	125°C	145°C	145 °C	150°C	
	b) <i>50 percent by volume recovered at, in °C</i>	←-----Not limited but to be reported-----→							
	c) <i>95 percent by volume recovered at, in °C</i>	←-----Not limited but to be reported-----→							
	d) <i>Final boiling point, Max</i>		—	—	240°C	205°C	205°C	300°C	
	e) <i>Dry point, Max</i>	80°C	120°C	135°C	—	—	—	—	

The 95 percent volume recovery temperature is mentioned as reported and no requirement is specified.

5. Similarly, in IS 1459 Kerosene, distillation is specified as given below:

SI No.	Charecteristic	Requirement		Test Method Refer to [P:] of IS 1448/ISO/ASTM/IP/ Annex
		Grade A	Grade B	
(1)	(2)	(3)	(4)	(5)
vii)	Distillation			[P : 18] ¹⁾ /ISO 3405/ ASTM D 86
	a) Percent recovered below 200°C, percent (v/v), <i>Min</i>	20	20	
	b) Final boiling point, °C, <i>Max</i>	300	300	

Research Methodology

The research methodology adopted is as follows:

1. To collect data from the oil companies for the above parameter of distillation for the period of 2019-2020, month-wise.
2. Testing of atleast 3 different samples to be witnessed, in three different locations for comparison and confirmation of data
3. The data obtained will be analyzed for carrying out necessary modifications / revision of both specifications.

I Obtaining data on distillation characteristics of kerosene (IS 1459) and petroleum hydrocarbons, (IS 1745)

The proposal was circulated to all the members on 9 September 2020 requesting them to provide the data of distillation characteristics of kerosene and petroleum hydrocarbons for the period of 2019-2020. Data has been received from MRPL, IOCL, HPCL and BPCL. SFPL, IIP informed that they have not received any kerosene samples in the last two years and they do not test solvents. The data received from MRPL is of kerosene only. IOCL, BPCL and HPCL has provided data for both kerosene and solvent. Some of the data pertains to 2020-2021.

Data has been separately given below, for distillation characteristics of kerosene as Section I and that of petroleum hydrocarbon solvents as Section II.

SECTION I

Data of Test results of Distillation characteristics of Kerosene [IS 1459]

I Organisation: Mangalore Refinery and Petrochemicals Limited

Place: Mangalore

Data pertains to: 2019-2020

Data compiled by: Yogeesha (Chief Manager QC, R&D)

Sl No.	Date of production	Batch No.	Sample Code	Date of testing	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	01-01-19	6	Grade A	03-01-19	159.8	190	212.3	229	
2	01-01-19	1625	Grade B	03-01-19	169.4	191.7	216.7	236.3	
3	12-01-19	7	Grade A	13-01-19	171	191.5	210.9	228.8	
4	10-01-19	1626	Grade B	11-01-19	158.7	191.4	217.3	236.3	
5	15-01-19	1627	Grade B	16-01-19	159.7	188	214.6	233.8	
6	22-01-19	8	Grade A	23-01-19	174.5	190.5	209.9	228.3	
7	07-02-19	1628	Grade B	08-02-19	164.8	190.8	215.3	235.1	
8	20-02-19	9	Grade A	21-02-19	173.8	191.4	211.1	226.6	
9	13-03-19	10	Grade A	14-03-19	163.4	187.6	212.9	232.3	
10	19-03-19	1629	Grade B	21-03-19	161	192.1	221.9	243.7	
11	13-03-19	11	Grade A	14-03-19	173.3	189.2	208.5	225.4	
12	03-04-19	12	Grade A	04-04-19	172.1	189.3	209	225.3	
13	17-04-19	13	Grade A	18-04-19	168.4	188.5	208.1	223.9	
14	19-04-19	1630	Grade B	20-04-19	163	190.5	216.5	239.7	
15	21-05-19	1631	Grade B	22-05-20	161	188.8	215.8	235.9	
16	25-05-19	14	Grade A	26-05-19	170.9	187.2	208	226.8	
17	09-06-19	1632	Grade B	10-06-19	161.3	185.5	212.1	231.6	
18	18-06-19	15	Grade A	20-06-19	166.6	186	208.6	235.8	
19	23-06-19	1633	Grade B	24-06-19	161.7	185.5	210.7	229.5	

20	26-06-19	16	Grade A	27-06-19	167.9	185.6	207.9	232.8	
21	05-07-19	17	Grade A	07-07-19	167.1	186.4	205.5	224.2	
23	26-07-19	1634	Grade B	27-07-19	153.1	189.1	216.5	233.6	
24	17-07-19	18	Grade A	19-07-19	170	188.2	217.1	233.3	
25	04-08-19	19	Grade A	06-08-19	170.6	187.5	211.3	234.5	
26	22-08-19	20	Grade A	24-08-19	170.2	189.8	215.8	244.3	
27	17-09-19	21	Grade A	18-09-19	167.9	188.9	214.4	238.5	
28	27-09-19	22	Grade A	29-09-19	171.8	191.2	216.6	241.7	
29	08-10-19	1635	Grade B	09-10-19	153.4	189.8	218.3	238	
30	14-10-19	23	Grade A	15-10-19	171.8	192.6	217.6	243.6	
31	31-10-19	24	Grade A	02-11-19	170.1	191	214.6	238	
32	11-11-19	25	Grade A	13-11-19	170.8	192.8	219.8	245.7	
33	22-11-19	26	Grade A	24-11-19	170.3	191	216.3	238.1	
34	09-12-19	1636	Grade B	10-12-19	159.9	193.1	225.6	245.3	
35	09-12-19	27	Grade A	10-12-19	170	192.5	21.2	243.5	
36	18-12-19	28	Grade A	19-12-19	171.7	193	218.4	241.4	
37	20-12-19	29	Grade A	22-12-19	171	193.1	218.6	240.5	
38	31-12-19	30	Grade A	01-01-20	161.6	195	218.6	240	
39	02-01-20	1637	Grade B	03-01-20	168.5	193.2	222.9	241.7	
40	15-02-20	1638	Grade B	17-02-20	155.4	189.8	216.9	232.5	
41	12-01-20	31	Grade A	12-01-20	170.7	192.1	217.4	239.6	
42	20-01-20	32	Grade A	20-01-20	165.4	176.9	211.5	234.5	
43	31-01-20	33	Grade A	31-01-20	169.5	188	210.9	234.2	
44	21-02-20	34	Grade A	21-02-20	168.6	188.4	210.6	231.4	
45	29-02-20	35	Grade A	29-02-20	170.4	187.4	210.4	233.2	
46	05-03-20	36	Grade A	05-03-20	172.7	187.5	210.3	233	
47	13-03-20	37	Grade A	13-03-20	171	187	208.4	232.2	
48	23-03-20	38	Grade A	23-03-20	173.7	188.4	209.7	231.4	
49	01-04-20	39	Grade A	01-04-20	169	189	211.3	235.3	
50	30-04-20	40	Grade A	30-04-20	171.7	179.6	214.5	237.3	
51	24-05-20	41	Grade A	24-05-20	151.4	186.4	218.2	248.4	
52	02-06-20	42	Grade A	02-06-20	168.3	186.6	212	242.1	
53	19-06-20	43	Grade A	19-06-20	165	182.5	205.6	228	
54	01-07-20	44	Grade A	01-07-20	161	181.7	202.8	225.4	
55	14-07-20	45	Grade A	14-07-20	162.6	181.8	203.2	224.7	
56	31-07-20	46	Grade A	31-07-20	164	180.7	203.1	224.9	
57	05-08-20	47	Grade A	05-08-20	157.1	192.6	230.4	259.3	
58	18-08-20	48	Grade A	18-08-20	163.9	182.4	203.9	225.6	
59	07-09-20	49	Grade A	07-09-20	166.4	184.1	205.2	224.4	

II Organisation: Hindustan Petroleum Corporation Limited

Place: Irumpanam, Kochi

Data pertains to: 2019-2020

Data compiled by: V Mahadhevan

Sl No.	Date of production	Batch No.	Sample Code	Date of testing	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	30-12-19			30-12-19	174.9	216.5	265.3	270	ILCP Sample

Organisation: Hindustan Petroleum Corporation Limited

Place: Irumpanam, Kochi

Data pertains to: 2020-2021

Data compiled by: V Mahadhevan

Sl No.	Date of production	Batch No.	Sample Code	Date of testing	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	03-09-20			03-09-20	149.3	186.1	243.8	264.1	
2	03-09-20			03-09-20	148.1	186	242.1	264.6	

Organisation: Hindustan Petroleum Corporation Limited

Place: Mahul Terminal QC Lab

Data pertains to: 2020-2021

Data compiled by: Suryaprakash & N D Bamane

Sl No.	Date of production	Batch No.	Sample Code	Date of testing	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	08-04-2020	TK 452/BFT-03	952698	08-04-2020	144.5	198.9	244.5	253.5	
2	23-04-2020	TK 452/BFT-14	953926	23-04-2020	147	199.8	246.9	258.7	

3	10-05-2020	TK 452/BFT-24	955788	11-05-2020	146.5	196.2	241.3	253.4	
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Organisation: Hindustan Petroleum Corporation Limited
Place: Mumbai Refinery
Data pertains to: 2020-2021
Data compiled by: Rajesh D. Vartak (QCO, HPCL-MR)

Sl No.	Date of production	Batch No.	Sample Code	Date of testing	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	17-09-2020	372/20	S-2949	17-09-2020	145	196.5	235.5	241.5	
2	19-09-2020	373/20	S-2999	19-09-2020	145.5	197.5	236	242.5	
3	21-09-2020	372/20	S-3020	21-09-2020	144.5	199.5	239.5	250	

Organisation: Hindustan Petroleum Corporation Limited
Place: VISAKHA WHITE OIL TERMINAL, VISAKHAPATNAM
Data pertains to: 2020-2021
Data compiled by: VWOT Lab

Sl No.	Date of production	Batch No.	Sample Code	Date of testing	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	13-07-2019	TK 303		13-07-2019	146.5	198.2	260.7	278.4	
2	30-08-2019	TK 303		30-08-2019	148.4	195.8	253	270.9	
3	12-10-2019	TK 304		14-10-2019	146.9	198.4	276.8	284.1	
4	25-10-2019	TK 304		25-10-2019	141.8	193.2	262.2	273.5	
5	28-10-2019	TK 304		28-10-2019	141.8	193.2	253.6	273.5	
6	11-11-2019	TK 304		11-11-2019	146.9	197.8	267.7	274.2	
7	13-03-2020	TK 304		13-03-2020	154.5	184.3	248.1	259	

III Organisation: Indian Oil Corporation Limited

Place: Panipat

Data pertains to: 2020-2021

Sl No.	Sample Code	Date of production	Density @ 15 °C, kg/m ³	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)						
				IBP, °C	5%, °C	10%, °C	50%, °C	90%, °C	95%, °C	FBP, °C
1	53	28.06.2020	802.7	162	173	176	193	223	232	244
2	54	05.07.2020	802.2	161	173	177	196	226	235	248
3	52	11.07.2020	799.9	160	171	175	191	223	231	243
4	52	12.08.2020	799.6	165	171	173	190	220	230	244
5	52	08.09.2020	799.6	162	170	173	188	222	231	243

Organisation: Indian Oil Corporation Limited

Place: Gujarat Refinery

Data pertains to: 2020-2021

Date of Testing	Tank No	STAT US	Quantity, KL	Appearance	Flash Point	ASTM/Saybolt Colour	Density (kg/m ³)	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)							% Rec@70/100/200/360
								IBP	5%	10%	50%	90%	95%	DP/FB	
22-09-2020	718	F	10240	CLEAR	41	23	805.3	147	166	173	202	245	255	265	48%
20-09-2020	718	F	8690	CLEAR	39.5	24	809.6	144	162	168	201	244	252	264	49%
16-09-2020	716	F	10190	CLEAR	39.5	26	807.4	146	161	168	199	249	251	264	51%
15-09-2020	718	F	10230	CLEAR	40	22	806	149	163	168	200	244	252	262	50%
10-09-2020	717	F	10251	CLEAR	39	24	809.3	143	161	167	200	245	254	262	50%
08-09-2020	717	F	9659	CLEAR	39.5	24	808.8	148	164	168	198	243	253	261	52%
06-09-2020	716	F	10302	CLEAR	39.5	25	807.6	146	163	168	199	244	253	261	51%
01-09-2020	717	F	10159	CLEAR	39.5	24	808.6	146	163	169	198	243	253	263	53%

IV Organization: Bharat Petroleum Corporation Limited

ANNEX I

Data of Test Results of Distillation Characteristics of Kerosene [IS 1459]

Organization : Bharat Petroleum Corporation Limited
 Place : Kochi Refinery
 Data Pertains to : 2019-2020
 Data Compiled by : Adalazhagan K

Sl no.	Date of Production	Batch No.	Sample Code	Date of Testing	Test results of Distillation Characteristics, when tested as per IS 1448 : P[18]				Remarks
					Initial Boiling Point, IBP, Min, Deg C	Recovery temperature at 50% v/v, Deg C	Recovery temperature at 95% v/v, Deg C	Final Boiling Point, FBP, Max, Deg C	
1		KER/BPC/KR/381/38		12-Jan-19	144	184	250	256	
2		KER/BPC/KR/381/39		16-Jan-19	141	184	250	257	
3		KER/BPC/KR/385/40		17-Jan-19	144	197	244	250	
4		KER/BPC/KR/385/41		21-Jan-19	142	182	244	250	
5		KER/BPC/KR/381/40		22-Jan-19	144	184	251	258	
6		KER/BPC/KR/381/41		2-Feb-19	145	188	249	256	
7		KER/BPC/KR/381/42		8-Feb-19	144	184	248	255	
8		KER/BPC/KR/381/43		13-Feb-19	145	185	251	258	
9		KER/BPC/KR/381/44		2-Mar-19	144	199	250	256	
10		KER/BPC/KR/381/45		6-Mar-19	141	181	250	256	
11		KER/BPC/KR/381/46		18-Mar-19	142	183	245	252	
12		KER/BPC/KR/381/47		5-Apr-19	143	186	249	255	
13		KER/BPC/KR/381/48		10-Apr-19	144	188	259	265	
14		KER/BPC/KR/381/49		13-Apr-19	144	184	261	267	
15		KER/BPC/KR/381/50		24-Apr-19	141	182	260	267	
16		KER/BPC/KR/385/42		27-Apr-19	141	185	250	256	
17		KER/BPC/KR/385/43		9-May-19	146	186	252	258	
18		KER/BPC/KR/30/46		19-May-19	145	189	240	246	
19		KER/BPC/KR/385/44		21-May-19	147	188	252	258	
20		KER/BPC/KR/30/47		3-Jun-19	141	184	238	244	
21		KER/BPC/KR/385/45		5-Jun-19	145	185	247	253	
22		KER/BPC/KR/381/51		6-Jun-19	144	188	239	247	
23		KER/BPC/KR/385/46		13-Jun-19	146	189	245	251	
24		KER/BPC/KR/385/47		15-Jun-19	142	186	251	257	
25		KER/BPC/KR/30/48		20-Jun-19	143	186	245	250	
26		KER/BPC/KR/381/52		30-Jun-19	134	178	262	268	
27		KER/BPC/KR/381/53		3-Jul-19	140	181	272	278	
28		KER/BPC/KR/385/48		14-Jul-19	140	180	261	267	
29		KER/BPC/KR/30/49		23-Jul-19	140	181	238	243	
30		KER/BPC/KR/385/49		24-Jul-19	141	185	254	260	
31		KER/BPC/KR/385/50		2-Aug-19	141	181	254	259	
32		KER/BPC/KR/30/50		13-Aug-19	142	183	237	241	
33		KER/BPC/KR/381/54		13-Aug-19	143	183	255	261	
34		KER/BPC/KR/381/55		18-Aug-19	144	187	259	264	
35		KER/BPC/KR/381/56		22-Aug-19	140	179	254	261	
36		KER/BPC/KR/381/57		30-Aug-19	143	184	267	273	
37		KER/BPC/KR/381/58		26-Sep-19	144	187	265	271	
38		KER/BPC/KR/381/59		17-Oct-19	145	186	258	263	
39		KER/BPC/KR/381/60		30-Oct-19	142	183	246	252	
40		KER/BPC/KR/30/51		6-Nov-19	140	180	236	242	
41		KER/BPC/KR/381/61		12-Nov-19	145	189	242	248	
42		KER/BPC/KR/381/62		14-Nov-19	142	182	250	257	
43		KER/BPC/KR/381/63		20-Nov-19	143	183	249	255	
44		KER/BPC/KR/381/64		18-Dec-19	143	184	252	258	
45		KER/BPC/KR/381/65		21-Dec-19	143	186	254	260	
46		KER/BPC/KR/385/51		1-Jan-20	146	186	251	257	
47		KER/BPC/KR/381/66		4-Jan-20	140	181	251	256	
48		KER/BPC/KR/381/67		17-Jan-20	141	185	245	252	
49		KER/BPC/KR/385/52		26-Jan-20	141	180	240	246	
50		KER/BPC/KR/30/52		31-Jan-20	141	181	234	240	
51		KER/BPC/KR/30/53		7-Feb-20	146	190	236	242	
52		KER/BPC/KR/381/68		15-Feb-20	144	184	250	256	
53		KER/BPC/KR/381/69		18-Feb-20	145	188	244	251	
54		KER/BPC/KR/385/53		24-Feb-20	147	190	244	250	
55		KER/BPC/KR/381/70		27-Feb-20	141	181	243	249	
56		KER/BPC/KR/30/54		9-Mar-20	145	186	241	247	
57		KER/BPC/KR/30/55		26-Mar-20	144	187	241	247	
58		KER/BPC/KR/381/71		9-Apr-20	146	187	239	246	
59		KER/BPC/KR/385/54		11-Apr-20	143	182	234	251	

60		KER/BPC/KR/381/72		27-Apr-20	145	185	225	240	
61		KER/BPC/KR/381/73		11-May-20	147	187	238	244	
62		KER/BPC/KR/381/74		22-May-20	141	180	236	253	
63		KER/BPC/KR/385/55		2-Jun-20	149	191	237	254	
64		KER/BPC/KR/381/75		13-Jun-20	143	182	236	253	
65		KER/BPC/KR/385/56		16-Jun-20	151	190	238	255	
66		KER/BPC/KR/385/57		6-Jul-20	147	186	222	240	
67		KER/BPC/KR/385/58		8-Jul-20	144	183	230	246	
68		KER/BPC/KR/385/59		12-Jul-20	143	184	223	241	
69		KER/BPC/KR/385/60		14-Jul-20	143	183	239	246	
70		KER/BPC/KR/385/61		20-Jul-20	144	183	223	240	
71		KER/BPC/KR/385/62		21-Aug-20	148	184	227	244	
72		KER/BPC/KR/385/63		30-Aug-20	142	181	238	244	
73		KER/BPC/KR/381/76		15-Sep-20	150	189	227	244	

ANNEX I

Data of Test Results of Distillation Characteristics of Kerosene [IS 1459]

Organization

Bharat Petroleum Corporation Limited

Place

Mumbai

Data Pertains to : 2019-2020

2019-2020

Data Compiled by

Ajit KK

Sl no.	Date of Production	Batch No.	Sample Code	Date of Testing	Test results of Distillation Characteristics, when tested as per IS 1448 : P[18]				Remarks
					Initial Boiling Point, IBP, Min, Deg C	Recovery temperature at 50% v/v, Deg C	Recovery temperature at 95% v/v, Deg C	Final Boiling Point, FBP, Max, Deg C	
1	03.04.19	SK / 42		03.04.19	148.3	204.5	253.9	268.5	
2	08.04.19	SK / 43		08.04.19	153.9	195.6	259.9	274.4	
3	09.04.19	SK / 44		09.04.19	138.2	199.4	247.7	264.9	
4	12.04.19	SK / 45		12.04.19	159.4	203	256.7	269.7	
5	15.04.19	SK / 46		15.04.19	147.1	200.2	248.0	265.9	
6	21.04.19	SK / 47		21.04.19	160.5	209.7	264.2	278.6	
7	22.04.19	SK / 48		22.04.19	148.0	200.7	257.2	270.5	
8	27.04.19	SK / 50		27.04.19	148.1	200.4	253.4	271.9	
9	29.04.19	SK / 51		29.04.19	148.8	201.0	256.4	272.4	
10	03.05.19	SK / 52		03.05.19	169.4	221.2	276.8	291.0	
11	05.05.19	SK / 53		05.05.19	165.6	213.5	265.4	280.3	
12	06.05.19	SK / 54		06.05.19	151.1	207.1	262.0	277.3	
13	06.05.19	SK / 55		06.05.19	158.1	226.1	280.5	297.3	
14	07.05.19	SK / 56		07.05.19	149.7	203.8	260.0	275.2	
15	09.05.19	SK / 57		09.05.19	163.4	216.7	262.3	277.3	
16	13.05.19	SK / 58		13.05.19	150.8	207.8	265.0	280.5	
17	23.05.19	SK / 59		23.05.19	165.4	215.1	267.3	286.0	
18	28.05.19	SK / 60		28.05.19	156.3	211.7	269.7	284.3	
19	31.05.19	SK / 61		31.05.19	166.6	216.5	263.2	281.4	
21	06.06.19	SK / 62		06.06.19	159.1	210.1	266.8	279.3	
22	18.06.19	SK / 63		18.06.19	159.1	203.2	249.2	286.7	
23	30.06.19	SK / 64		30.06.19	165.0	215.2	266.5	283.7	
24	11.07.19	SK / 65		11.07.19	167.7	211.4	261.7	276.5	
25	12.07.19	SK / 66		12.07.19	159.6	210.3	263.1	278.6	
26	18.07.19	SK / 67		18.07.19	165.1	208.0	256.7	274.5	
27	19.07.19	SK / 68		19.07.19	151.1	207.2	255.7	272.9	
28	22.07.19	SK / 69		22.07.19	149.9	205.6	251.8	272.4	
29	26.07.19	SK / 70		26.07.19	147.2	204.4	252.6	269.9	
30	27.07.19	SK / 71		27.07.19	157.2	203.8	258.0	276.5	
31	30.07.19	SK / 72		30.07.19	155.2	194.8	243.2	258.9	
32	31.07.19	SK / 73		31.07.19	144.7	203.7	253.0	271.3	
33	07.08.19	SK / 74		07.08.19	156.0	202.2	258.9	274.4	
34	08.08.19	SK / 75		08.08.19	148.8	201.6	254.3	268.6	
35	11.08.19	SK / 76		11.08.19	147.8	182.7	241.7	254.6	
36	28.08.19	SK / 77		28.08.19	155.8	202.8	256.8	276.0	
37	30.08.19	SK / 78		30.08.19	156.9	203.2	253.2	269.7	
38	03.09.19	SK / 79		03.09.19	147.3	189.2	248.7	265.7	
39	05.09.19	SK / 80		05.09.19	148.7	198.4	248.2	262.4	
40	09.09.19	SK / 81		09.09.19	147.5	187.8	244.2	260.3	
41	10.09.19	SK / 82		10.09.19	155.2	196.5	253.9	269.4	
42	14.09.19	SK / 83		14.09.19	156.7	200.4	253.6	268.0	
43	20.09.19	SK / 85		20.09.19	152.3	198.9	251.0	265.9	
44	24.09.19	SK / 87		24.09.19	158.8	200.8	255.4	268.7	
45	29.09.19	SK / 88		29.09.19	147.7	197.4	246.7	262.1	
46	30.09.19	SK / 89		30.09.19	153.8	199.1	250.2	266.2	
47	03.10.19	SK / 90		03.10.19	154.4	197.6	247.3	266.2	

48	04.10.19	SK / 91		04.10.19	153.1	198.8	248.9	266.0	
49	08.10.19	SK / 92		08.10.19	151.5	197.0	250.3	262.2	
50	09.10.19	SK / 93		09.10.19	150.1	202.1	250.5	265.2	
51	14.10.19	SK / 94		14.10.19	149.3	207.5	256.9	268.8	
52	17.10.19	SK / 95		17.10.19	146.2	196.1	245.0	253.2	
53	21.10.19	SK / 96		21.10.19	167.7	209.3	258.4	270.4	
54	22.10.19	SK / 98		22.10.19	144.3	202.2	248.2	262.7	
55	26.10.19	SK / 99		26.10.19	172.1	218.2	263.9	277.1	
56	31.10.19	SK / 100		31.10.19	148.7	204.4	249.7	266.0	
57	04.11.19	SK / 101		04.11.19	160.0	196.7	254.5	270.3	
58	07.11.19	SK / 102		07.11.19	171.4	212.7	257.1	269.4	
59	08.11.19	SK / 103		08.11.19	149.3	206.3	252.4	267.2	
60	12.11.19	SK / 104		12.11.19	147.3	202.5	250.0	265.2	
61	13.11.19	SK / 105		13.11.19	158.4	197.1	256.7	269.3	
62	16.10.19	SK / 106		16.10.19	158.8	206.3	266.0	285.6	
63	19.11.19	SK / 107		19.11.19	148.9	202.3	251.5	263.7	
64	22.11.19	SK / 108		22.11.19	157.0	195.9	258.1	270.2	
65	24.11.19	SK / 109		24.11.19	148.7	201.8	249.2	263.8	
66	25.11.19	SK / 110		25.11.19	157.0	202.3	252.6	273.0	
67	27.11.19	SK / 111		27.11.19	144.9	203.8	254.4	270.6	
68	27.11.19	SK / 112		27.11.19	148.1	197.2	248.6	266.2	
69	30.11.19	SK / 113		30.11.19	156.6	198.6	260.9	275.0	
70	30.11.19	SK / 114		30.11.19	147.2	198.1	250.1	267.7	
71	03.12.19	SK / 115		03.12.19	148.1	197.5	253.1	267.7	
72	06.12.19	SK / 116		06.12.19	155.6	198.9	255.2	271.0	
73	07.12.19	SK / 117		07.12.19	144.9	197.4	253.4	267.1	
74	08.12.19	SK / 118		08.12.19	147.0	198.9	250.9	266.3	
75	11.12.19	SK / 119		11.12.19	157.1	203.6	263.0	278.4	
76	14.12.19	SK / 121		14.12.19	149.3	198.7	252.3	269.9	
77	15.12.19	SK / 122		15.12.19	155.1	194.6	253.9	267.3	
78	21.12.19	SK / 123		21.12.19	149.1	199.7	253.2	269.9	
79	21.12.19	SK / 124		21.12.19	156.3	202.3	251.5	266.2	
80	25.12.19	SK / 125		25.12.19	150.6	198.4	253.3	269.4	
81	31.12.19	SK / 126		31.12.19	146.4	198.4	245.5	261.1	
82	06.01.20	SK / 127		06.01.20	148.6	201.1	250.7	265.3	
83	06.01.20	SK / 128		06.01.20	160.4	211.6	260.4	279.2	
84	10.01.20	SK / 129		10.01.20	162.9	214.8	256.1	271.1	
85	13.01.20	SK / 130		13.01.20	154.9	212.4	259.9	274.9	
86	14.01.20	SK / 131		14.01.20	154.7	200.0	253.4	271.1	
87	19.01.20	SK / 132		19.01.20	150.1	206.8	258.4	272.3	
88	21.01.20	SK / 133		21.01.20	145.7	187.3	247.5	265.7	
89	21.01.20	SK / 134		21.01.20	169.6	218.9	265.2	274.4	
90	26.01.20	SK / 135		26.01.20	145.4	203.0	249.3	264.3	
91	26.01.20	SK / 136		26.01.20	149.2	195.5	252.4	265.3	
92	31.01.20	SK / 137		31.01.20	144.8	202.2	249.9	262.5	
93	03.02.20	SK / 138		03.02.20	152.9	289.2	260.4	270.2	
94	06.02.20	SK / 139		06.02.20	151.0	206.0	254.4	268.0	
95	11.02.20	SK / 140		11.02.20	160.1	208.7	263.1	274.4	
96	13.02.20	SK / 141		13.02.20	163.8	209.4	263.1	273.5	
97	19.02.20	SK / 142		19.02.20	142.6	199.5	243.4	257.8	
98	20.02.20	SK / 143		20.02.20	147.7	176.4	233.1	251.4	
99	20.02.20	SK / 144		20.02.20	146.7	188.4	249.7	265.1	
100	24.02.20	SK / 145		24.02.20	144.6	198.6	248.0	261.2	

101	28.02.20	SK / 146		28.02.20	145.4	199.3	249.8	263.6	
102	06.03.20	SK / 147		06.03.20	152.7	208.2	255.4	270.0	
103	09.03.20	SK / 148		09.03.20	163.5	211.3	261.7	271.6	
104	11.03.20	SK / 149		11.03.20	148.8	194.2	253.2	265.8	
105	13.03.20	SK / 150		13.03.20	150.2	204.0	251.3	266.0	
106	14.03.20	SK / 151		14.03.20	157.1	208.8	254.8	271.0	
107	15.03.20	SK / 152		15.03.20	157.3	203.1	256.3	269.2	
108	18.03.20	SK / 153		18.03.20	152.0	206.0	257.5	269.5	
109	18.03.20	SK / 154		18.03.20	156.4	209.3	255.4	267.8	
110	20.03.20	SK / 155		20.03.20	150.5	199.3	251.7	262.8	
111	23.03.20	SK / 156		23.03.20	165.0	213.2	256.6	264.6	
112	26.03.20	SK / 157		26.03.20	150.4	206.0	254.5	265.1	
113	27.03.20	SK / 158		27.03.20	147.7	204.6	254.1	264.4	

SECTION II

Data of Test results of Distillation characteristics of Petroleum hydrocarbon solvent 120/240 [IS 1745]

I Organisation: Hindustan Petroleum Corporation Limited

Place: Irumpanam, Kochi

Data pertains to: 2019-2020

Data compiled by: V Mahadhevan

Sl no	Date of production	Batch no.	Sample code	Date of testing	Test results of Distillation characteristics, when tested as per IS 1448 (Part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	27.12.2019	MTO/TT/HPC/HTI RPM/014/045	922722	28.12.2019	137	185	215	223	TK 14
2	27.12.2019	MTO/TT/HPC/HTI RPM/014/046	922734	07.01.2020	134	184	215	224	TK 14
3	06.01.2020	MTO/TT/HPC/HTI RPM/014/047	925526	07.01.2019	137	183	214	222	TK 14
4	22.01.2020	MTO/TT/HPC/HTI RPM/014/051	930654	22.01.2020	143	184	207	224	TK 14
5	29.01.2020	MTO/TT/HPC/HTI RPM/014/053	932989	29.01.2020	144	184	214	223	TK 14
6	20.01.2020	MTO/TT/HPC/HTI RPM/014/050	930159	20.01.2020	140	182	203	225	TK 14

Organisation: Hindustan Petroleum Corporation Limited

Place: Mahul Terminal QC Lab

Data pertains to: 2019-2020

Data compiled by: Suryaprakash & N D Bamane

Sl	Date of production	Batch No.	Sample Code	Date of testing	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	21.03.2020	TK603/BFT-511	950078	21.03.2020	141.1	188.6	218.7	224.3	
2	21.03.2020	TK98/BFT-512	950180	21.03.2020	141.4	188.9	219.6	231.9	
3	28.03.2020	TK603/BFT-517	95.845	28.03.2020	141.5	188.9	219.9	234.5	
4	13.04.2020	TK98/BFT-006	952980	13.04.2020	145.3	187.5	219.4	236.8	
5	07.05.2020	TK603/BFT-022	955569	08.05.2020	144.8	187	217.1	235.6	
6	11.05.2020	TK98/BFT-026	956005	11.05.2020	145.5	183.2	216.4	228.7	
7	12.05.2020	TK603/BFT-027	956268	13.05.2020	146.1	185.8	217.4	231.3	
8	24.05.2020	TK603/BFT-038	957792	26.05.2020	152.3	184.3	214.8	220	
9	02.06.2020	TK98/BFT-044	959170	02.06.2020	149.4	184.2	212.2	226	
10	06.06.2020	TK603/BFT-049	960080	06.06.2020	150.1	184.2	210.2	219	
11	06.06.2020	TK98/BFT-050	960078	08.06.2020	149.7	184.8	214.1	223.1	
12	15.06.2020	TK603/BFT-066	961907	16.06.2020	146.8	180.9	207.1	220.5	
13	16.06.2020	TK98/BFT-068	961909	16.06.2020	147.7	181.1	205.3	210.2	
14	22.06.2020	TK603/BFT-077	962928	22.06.2020	141.4	187.1	216.1	224	
15	22.06.2020	TK98/BFT-080	963115	23.06.2020	142.8	187.2	215.4	234.5	
16	27.06.2020	TK98/BFT-085	964457	27.06.2020	142.6	188.7	219.1	228.7	
17	29.06.2020	TK603/BFT-087	964652	29.06.2020	142.2	184.5	213.4	221.7	
18	03.07.2020	TK98/BFT-091	965558	04.07.2020	146	187.7	220.1	229.4	
19	07.07.2020	TK603/BFT-096	966222	07.07.2020	139.7	187.1	216.9	221.4	
20	07.07.2020	TK98/BFT-098	966326	08.07.2020	140.6	187.6	216.3	221.4	

21	11.07.20 20	TK603/BFT- 103	9670 98	11.07.20 20	143.8	181	208.8	217.2	
22	11.07.20 20	TK98/BFT- 105	9671 51	13.07.20 20	144.2	180.4	207.7	213.5	
23	16.07.20 20	TK98/BFT- 113	9680 51	17.07.20 20	143	180.2	207.3	221.6	
24	16.07.20 20	TK603/BFT- 114	9680 52	17.07.20 20	145.1	179.5	205.9	216.9	
25	20.07.20 20	TK98/BFT- 116	9688 51	20.07.20 20	145.5	186.1	217.3	226.4	
26	20.07.20 20	TK603/BFT- 117	9688 52	21.07.20 20	145.5	184.6	214.7	221.6	
27	28.07.20 20	TK98/BFT- 128	9703 71	28.07.20 20	146	185	215	222.7	
28	03.08.20 2	TK603/BFT- 138	9714 95	03.08.20 20	148	189.3	218.3	227	
29	03.08.20 20	TK98/BFT- 140	9716 53	04.08.20 20	140.2	189.9	222	231.5	
30	03.08.20 20	TK603/BFT- 141	9720 08	04.08.20 20	145.1	189.7	220	229.8	
31	13.08.20 20	TK603/BFT- 155	9756 18	14.08.20 20	149.6	184.8	214.4	223.7	
32	13.08.20 20	TK98/BFT- 156	9756 19	14.08.20 20	142	185.1	214.5	235.4	
33	14.08.20 20	TK98/BFT- 159	9759 25	17.08.20 20	147.2	182	212.2	225.3	
34	20.08.20 20	TK603/BFT 166	9767 02	20.08.20 20	145	183.5	213.8	225.7	
35	25.08.20 20	TK98/BFT- 171	9777 82	26.08.20 20	146.3	187	219	231.8	
36	27.08.20 20	TK603/BFT- 172	9781 63	27.08.20 20	145.2	186.8	218.5	234.9	
37	05.09.20 20	TK98/BFT- 182	9804 55	05.09.20 20	146.4	185.4	216.5	222	
38	05.09.20 20	TK603/BFT- 183	9804 56	07.09.20 20	145.5	185.6	215.8	229.4	
39	10.09.20 20	TK98/BFT- 186	9813 85	10.09.20 20	145.3	186.1	217.2	222.5	
40	10.09.20 20	TK603/BFT 187	9813 69	11.09.20 20	144.9	186.6	217.3	220.2	
41	15.09.20 20	TK603/BFT 193	9824 38	15.09.20 20	141.7	186.5	222.4	230.8	
42	15.09.20 20	TK98/BFT- 196	9824 95	16.09.20 20	137.8	186.2	220.2	235.2	
43	19.09.20 20	TK603/BFT- 200	9835 51	21.09.20 20	141.1	183.4	215.3	226.2	

Organisation: Hindustan Petroleum Corporation Limited

Place: Mumbai Refinery

Data pertains to: 2020-2021

Data compiled by: Rajesh D. Vartak (QCO, HPCL-MR)

Sl no	Date of production	batch no.	Sample code	Date of testing	Test results of Distillation characteristics, when tested as per IS 1448 (Part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	17/09/2020	372/20	S-2949	17/09/2020	145.0	196.5	235.5	241.5	----
2	19/09/2020	373/20	S-2999	19/09/2020	145.5	197.5	236.0	242.5	-----
3	21/09/2020	372/20	S-3020	21/09/2020	144.5	199.5	239.5	250.0	-----

Organisation: Hindustan Petroleum Corporation Limited

Place: VISAKHA WHITE OIL TERMINAL, VISAKHAPATNAM

Data pertains to: 2020-2021

Data compiled by: VWOT Lab

Sl No.	Date of production	Batch No.	Sample Code	Date of testing	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)				Remarks, if any
					Initial boiling point, Min	50 percent by volume recovered at, in °C)	95 percent by volume recovered at, in °C	Final boiling point, Max	
1	08.07.2019	TK 503		08.07.2019	151.4	187.2	212.1	222.5	
2	13.07.2019	TK 504		13.07.2019	149.3	189.1	213.4	223.9	
3	03.08.2019	TK 504		03.08.2019	149.6	182.5	207.3	217.6	
4	26.08.2019	TK 504		26.08.2019	146.5	183.4	209.9	216.4	
5	03.09.2019	TK 503		03.09.2019	150.6	184.2	208.7	223.5	
6	26.10.2019	TK 504		26.10.2019	145.3	181.3	210.2	219.4	
7	27.11.2019	TK 504		27.11.2019	145.8	183.3	222.8	232.9	
8	25.01.2020	TK 504		25.01.2020	143	186.4	213.2	223.3	
9	10.02.2020	TK 504		10.02.2020	141.5	187.9	222.4	232.7	

II Organisation: Indian Oil Corporation Limited

Place: Gujarat Refinery

Data pertains to: 2019-2020 & 2020-2021

Date of Testing	Tank No	STAT US	Quantity, KL	Appearance	ASTM/Saybolt Colour	Density (kg/m3)	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)						
							IBP	5%, in °C	10%, in °C	50%, in °C	90%, in °C	95%, in °C	DP/FBP
03-08-2020	108 F		417	CLEAR	21	790	154	163	167	181	207	218	229
06-07-2020	108 F		418	CLEAR	25	789.9	153	162	165	180	209	218	229
19-03-2020	108 F		622	CLEAR	26	789.3	153	163	165	180	208	218	231
15-03-2020	108 F		613	CLEAR	26	789.6	155	165	167	183	213	224	234
13-03-2020	108 F		628	CLEAR	26	789.3	155	164	167	182	213	223	235
08-03-2020	108 F		621	CLEAR	24	789.1	155	164	167	181	210	221	237

Organisation: Indian Oil Corporation Limited

Place: Panipat Refinery

Data pertains to: 2019-2020 & 2020-2021

Sl No.	Sample Code	Date of production	Density @ 15 °C, kg/m ³	Test Results of Distillation characteristics, when tested as per IS 1448 (part 18)							Remarks, if any
				IBP, °C	5%, °C	10%, °C	50%, °C	90%, °C	95%, °C	FBP, °C	
1	42	04-01-2020	788.7	172	175	176	182	190	193	202	
2	42	23-04-2020	788.7	168	172	173	177	185	188	197	
3	42	14-07-2020	788.7	167	171	172	177	185	189	197	

IV Organization: Bharat Petroleum Corporation Limited

ANNEX II

Data of Test Results of Distillation Characteristics of Petroleum Hydrocarbon Solvent, 120/240 [IS 1745]

Organization : **Bharat Petroleum Corporation Limited**
 Place : **Kochi Refinery**
 Data Pertains to : **2019-2020**
 Data Compiled by : **Adalazhagan K**

MTO Regular Grade

Sl no.	Date of Production	Batch No.	Sample Code	Date of Testing	Test results of Distillation Characteristics, when tested as per IS 1745 : P[18]				Remarks
					MTO Regular	Initial Boiling Point, IBP, Min, Deg C	Recovery temperature at 50% v/v, Deg C	Recovery temperature at 95% v/v, Deg C	
1		MTOR/BPC/KR/430/21		22-Apr-19	151	178	225	231	
2		MTOR/BPC/KR/430/22		27-Apr-19	152	179	227	233	
3		MTOR/BPC/KR/430/23		17-Jul-19	154	181	220	228	
4		MTOR/BPC/KR/430/24		29-Sep-19	153	182	214	220	
5		MTOR/BPC/KR/430/25		13-Nov-19	154	180	213	220	
6		MTOR/BPC/KR/430/26		18-Feb-20	154	181	215	221	
7		MTOR/BPC/KR/430/27		18-Mar-20	153	180	217	224	
8		MTOR/BPC/KR/430/28		25-Mar-20	151	178	232	239	
9		MTOR/BPC/KR/430/29		15-May-20	153	182	219	227	
10		MTOR/BPC/KR/430/30		16-May-20	154	181	221	228	
11		MTOR/BPC/KR/430/31		22-May-20	152	179	223	230	
12		MTOR/BPC/KR/430/32		27-May-20	152	178	216	224	
13		MTOR/BPC/KR/430/33		3-Jun-20	151	177	222	229	
14		MTOR/BPC/KR/430/34		11-Jun-20	152	179	220	227	
15		MTOR/BPC/KR/430/35		18-Jun-20	152	180	215	223	
16		MTOR/BPC/KR/430/36		21-Jun-20	154	181	216	223	
17		MTOR/BPC/KR/430/37		25-Jun-20	155	183	215	222	
18		MTOR/BPC/KR/430/38		28-Jun-20	154	181	217	223	
19		MTOR/BPC/KR/430/39		1-Jul-20	155	182	220	227	
20		MTOR/BPC/KR/430/40		2-Jul-20	154	181	222	229	
21		MTOR/BPC/KR/430/41		8-Jul-20	153	180	228	234	
22		MTOR/BPC/KR/430/42		20-Jul-20	155	182	225	232	
23		MTOR/BPC/KR/430/43		25-Jul-20	157	186	222	230	
24		MTOR/BPC/KR/430/44		29-Jul-20	156	179	226	233	
25		MTOR/BPC/KR/430/45		1-Aug-20	152	178	218	224	
26		MTOR/BPC/KR/430/46		10-Aug-20	150	179	221	230	
27		MTOR/BPC/KR/430/47		18-Aug-20	150	178	222	229	
28		MTOR/BPC/KR/430/48		20-Aug-20	151	177	217	225	
29		MTOR/BPC/KR/430/49		28-Aug-20	149	174	211	220	
30		MTOR/BPC/KR/430/50		3-Sep-20	149	176	217	224	
31		MTOR/BPC/KR/430/51		6-Sep-20	147	176	218	225	
32		MTOR/BPC/KR/430/52		10-Sep-20	152	179	220	228	
33		MTOR/BPC/KR/430/53		18-Sep-20	147	181	221	229	

ANNEX II

Data of Test Results of Distillation Characteristics of Petroleum Hydrocarbon Solvent, 120/240 [IS 1745]

Organization

Bharat Petroleum Corporation Limited

Place

Mumbai

Data Pertains to : 2019-2020

2019-2020

Data Compiled by

Ajit KK

Sl no.	Date of Production	Batch No.	Sample Code	Date of Testing	Test results of Distillation Characteristics, when tested as per IS 1745 : P[18]				Remarks
					Initial Boiling Point, IBP, Min, Deg C	Recovery temperature at 50% v/v, Deg C	Recovery temperature at 95% v/v, Deg C	Final Boiling Point, FBP, Max, Deg C	
1	01.04.19	MT / 50			154.4	173.9	196.8	205.5	
2	06.04.19	MT / 51			156.8	173.9	193.4	204.2	
3	07.04.19	MT / 52			155.2	172.6	193.8	202.5	
4	10.04.19	MT / 53			155.6	176.0	195.5	204.0	
5	12.04.19	MT / 54			155.0	173.5	194.7	203.0	
6	13.04.19	MT / 55			154.9	173.4	193.7	203.7	
7	16.04.19	MT / 56			155.4	173.0	194.2	202.9	
8	17.04.19	MT / 57			155.3	172.9	195.2	203.7	
9	19.04.19	MT / 58			146.6	172.7	194.4	202.7	
10	20.04.19	MT / 59			154.7	173.4	194.5	203.3	
11	23.04.19	MT / 60			152.0	170.9	193.5	203.2	
12	24.04.19	MT / 61			150.1	170.2	192.9	202.8	
13	25.04.19	MT / 62			142.9	168.0	190.0	200.2	
14	27.04.19	MT / 63			152.5	172.4	195.4	204.4	
15	28.04.19	MT / 64			152.9	171.6	194.8	203.7	
16	01.05.19	MT / 65			153.0	172.5	195.4	204.7	
17	04.05.19	MT / 66			141.5	190.2	228.5	240.1	
18	05.05.19	MT / 67			154.0	173.1	196.6	206.3	
19	07.05.19	MT / 68			152.4	172.8	197.5	204.9	
20	09.05.19	MT / 69			154.7	174.5	197.8	206.7	
21	10.05.19	MT / 70			151.7	173.4	195.8	203.2	
22	12.05.19	MT / 71			154.2	174.2	196.5	206.0	
23	14.05.19	MT / 72			154.0	173.8	197.4	206.4	
24	17.05.19	MT / 73			153.5	173.9	197.6	207.2	
25	19.05.19	MT / 74			152.1	173.8	200.9	209.0	
26	20.05.19	MT / 75			152.1	171.4	195.2	204.8	
27	21.05.19	MT / 76			152.9	172.9	197.5	206.7	
28	23.05.19	MT / 77			153.2	172.9	196.1	205.9	
29	25.05.19	MT / 78			152.3	173.1	196.5	206.8	
30	28.05.19	MT / 79			151.0	173.9	195.5	202.8	
31	31.05.19	MT / 80			152.0	175.0	197.6	205.2	
32	04.06.19	MT / 81			153.2	172.4	196.2	204.8	
33	08.06.19	MT / 82			153.0	173.0	196.6	204.8	
34	11.06.19	MT / 83			153.1	173.3	196.6	206.9	
35	13.06.19	MT / 84			152.7	172.6	195.7	205.4	
36	14.06.19	MT / 85			153.4	172.5	196.2	205.5	
37	18.06.19	MT / 86			152.8	172.5	196.3	206.1	
38	20.06.19	MT / 87			151.6	168.7	192.0	206.7	
39	20.06.19	MT / 88			148.8	167.4	192.8	204.2	
40	21.06.19	MT / 89			151.0	170.4	197.0	205.0	
41	08.07.19	MT / 90			157.0	172.4	193.8	203.9	
42	10.07.19	MT / 91			155.4	173.0	194.0	203.4	
43	10.07.19	MT / 92			156.9	173.9	197.6	206.5	
44	12.07.19	MT / 93			156.1	180.5	203.3	210.4	

45	13.07.19	MT / 94			156.0	177.3	197.7	206.2	
46	16.07.19	MT / 95			154.5	175.8	199.0	206.8	
47	18.07.19	MT / 96			153.8	175.1	198.7	208.4	
48	20.08.19	MT / 97			155.7	175.1	197.7	206.6	
49	23.07.19	MT / 98			153.8	174.2	196.8	206.7	
50	24.07.19	MT / 99			155.4	175.1	201.2	207.3	
51	28.07.19	MT / 100			155.1	174.0	196.8	206.6	
52	30.07.19	MT / 101			155.7	174.4	196.2	205.7	
53	30.07.19	MT / 102			152.6	172.7	195.1	206.0	
54	03.08.19	MT / 103			156.6	174.4	195.1	204.2	
55	07.08.19	MT / 104			156.7	171.4	190.3	203.1	
56	12.08.19	MT / 105			150.0	167.7	192.7	213.2	
57	14.08.19	MT / 107			149.4	167.7	194.7	209.5	
58	16.08.19	MT / 108			149.6	167.7	193.5	208.8	
59	17.08.19	MT / 109			149.7	167.4	194.4	210.1	
60	19.08.19	MT / 110			155.3	170.5	197.5	215.8	
62	21.08.19	MT / 113			154.6	167.8	187.7	194.6	
64	23.08.19	MT / 114			154.8	170.8	193.8	206.8	
65	24.08.19	MT / 116			155.9	164.7	181.2	191.2	
66	28.08.19	MT / 117			155.4	169.4	189.4	201.3	
67	01.09.19	MT / 119			153.7	173.1	195.7	203.1	
68	05.09.19	MT / 120			153.9	173.0	193.2	201.3	
69	05.09.19	MT / 121			155.4	171.8	193.4	202.0	
70	07.09.19	MT / 122			154.0	171.2	193.4	203.7	
71	10.09.19	MT / 123			154.2	171.4	192.2	202.7	
72	11.09.19	MT / 124			153.7	171.1	192.6	202.0	
73	12.09.19	MT / 125			154.0	171.2	192.8	200.8	
74	13.09.19	MT / 126			153.4	171.3	193.2	203.2	
75	15.09.19	MT / 127			157.1	180.2	208.0	216.7	
76	16.09.19	MT / 128			155.1	172.6	196.0	205.6	
77	18.09.19	MT / 129			155.4	172.4	195.9	205.1	
78	20.09.19	MT / 130			155.3	171.2	193.0	204.0	
79	21.09.19	MT / 131			154.2	171.2	191.8	204.3	
80	22.09.19	MT / 132			154.4	171.4	194.1	202.8	
81	24.09.19	MT / 133			154.0	166.2	182.0	190.1	
82	25.09.19	MT / 134			154.7	168.1	186.2	192.6	
83	27.09.19	MT / 135			154.6	170.6	191.2	198.5	
84	28.09.19	MT / 136			155.1	169.4	189.9	199.0	
85	29.09.19	MT / 137			154.3	168.7	188.9	199.2	
86	01.10.19	MT / 138			155.2	173.6	196.6	203.2	
87	02.10.19	MT / 139			152.3	169.0	187.3	195.9	
88	06.10.19	MT / 140			154.3	171.2	192.7	200.8	
89	08.10.19	MT / 141			153.8	170.1	191.1	199.5	
90	10.10.19	MT / 142			152.1	174.9	197.1	206.5	
91	12.10.19	MT / 143			152.9	170.1	191.6	198.1	
92	15.10.19	MT / 144			154.7	170.2	191.5	201.7	
93	16.10.19	MT / 145			154.2	169.6	190.1	198.9	
94	20.10.19	MT / 146			154.7	169.9	190.2	199.2	
95	25.10.19	MT / 147			152.6	169.8	192.3	200.8	
96	31.10.19	MT / 148			153.8	171.0	191.1	200.8	
97	02.11.19	MT / 149			154.2	170.8	193.8	200.7	
98	07.11.19	MT / 150			152.4	168.4	189.6	198.5	

99	09.11.19	MT / 151			154.3	168.6	187.3	196.8	
100	11.11.19	MT / 152			153.2	168.7	189.8	198.2	
101	12.11.19	MT / 153			154.1	168.4	188.5	199.7	
102	13.11.19	MT / 154			153.9	168.2	188.9	197.6	
103	16.11.19	MT / 155			153.8	168.8	191.1	198.6	
104	19.11.19	MT / 156			153.8	168.1	188.9	197.9	
105	22.11.19	MT / 157			154.4	168.9	189.0	198.5	
106	24.11.19	MT / 158			152.6	172.9	193.0	199.8	
107	25.11.19	MT / 159			155.3	170.7	188.1	197.2	
108	27.11.19	MT / 160			154.6	170.8	190.1	196.4	
109	30.11.19	MT / 161			155.1	171.1	190.2	197.9	
110	06.12.19	MT / 162			154.5	170.7	190.0	197.7	
111	08.12.19	MT / 163			153.8	169.8	190.1	197.9	
112	11.12.19	MT / 164			153.2	172.3	194.5	202.7	
113	13.12.19	MT / 165			152.1	170.7	193.3	201.8	
114	17.12.19	MT / 166			153.9	171.7	193.6	203.4	
115	17.12.19	MT / 167			153.1	170.9	193.7	203.0	
116	18.12.19	MT / 168			153.1	171.5	193.6	202.5	
117	21.12.19	MT / 169			151.4	171.8	194.5	201.8	
118	22.12.19	MT / 170			151.6	171.4	193.9	201.6	
119	25.12.19	MT / 171			152.1	171.7	194.0	201.4	
120	27.12.19	MT / 172			152.0	171.1	194.3	202.1	
121	29.12.19	MT / 173			152.8	172.9	195.6	203.9	
122	31.12.19	MT / 174			152.4	179.4	204.6	212.5	
123	01.01.20	MT / 175			151.5	177.9	207.0	209.0	
124	03.01.20	MT / 176			155.4	178.0	201.6	211.2	
125	05.01.20	MT / 177			153.6	175.9	198.4	207.2	
126	06.01.20	MT / 178			153.2	176.8	198.7	205.9	
127	08.01.20	MT / 179			154.2	176.1	198.1	206.3	
128	11.01.20	MT / 180			152.6	172.8	195.9	202.4	
129	11.01.20	MT / 181			151.6	172.6	196.2	203.8	
130	12.01.20	MT / 182			154.8	173.4	191.5	198.4	
131	16.01.20	MT / 183			151.7	171.2	192.0	201.0	
132	17.01.20	MT / 184			153.4	172.3	193.4	202.8	
133	18.01.19	MT / 185			153.8	173.9	196.2	205.2	
134	21.01.20	MT / 186			155.3	173.1	192.2	201.2	
135	22.01.20	MT / 187			152.0	171.8	192.3	199.1	
136	23.01.20	MT / 188			153.6	171.9	191.9	199.3	
137	25.01.20	MT / 189			153.6	171.6	190.7	198.4	
138	29.01.20	MT / 190			153.5	171.5	189.8	198.2	
139	02.02.20	MT / 191			154.8	174.0	195.1	203.9	
140	10.02.19	MT / 192			153.9	173.6	196.3	204.0	
141	11.02.20	MT / 193			153.3	171.2	192.2	200.0	
142	13.02.20	MT / 194			153.5	170.7	190.4	198.6	
143	14.02.20	MT / 195			153.5	170.6	190.6	197.8	
144	16.02.20	MT / 196			154.4	171.4	190.0	198.1	
145	18.02.19	MT / 197			154.7	171.5	190.3	198.4	
146	21.02.20	MT / 198			154.1	170.7	190.0	197.6	
147	25.02.20	MT / 199			154.8	171.4	189.4	198.5	
148	26.02.20	MT / 200			154.8	171.2	191.9	198.7	
149	28.02.20	MT / 201			155.4	172.8	191.8	199.9	
150	29.02.20	MT / 202			155.1	173.3	192.7	200.1	

151	04.03.20	MT / 203			156.0	173.9	194.2	202.3	
152	05.03.20	MT / 204			158.0	173.4	191.3	199.6	
153	06.03.20	MT / 205			154.5	171.2	191.0	198.6	
154	10.03.20	MT / 206			153.0	174.9	197.6	206.5	
155	11.03.20	MT / 207			154.5	175.6	197.5	204.3	
156	11.03.20	MT / 208			154.2	173.4	191.9	199.5	
157	14.03.20	MT / 209			153.8	175.8	198.8	204.9	
158	16.03.20	MT / 210			155.7	174.4	192.7	201.1	
159	17.03.20	MT / 211			154.2	174.9	193.4	201.1	
160	18.03.20	MT / 212			153.7	175.9	196.2	202.7	
161	20.03.20	MT / 213			155.1	175.1	193.7	201.0	
162	22.03.20	MT / 214			151.5	174.6	194.5	204.5	

I. The data was studied for its average values 95 percent recovery of kerosene and solvent and the graphical representation is as follows:

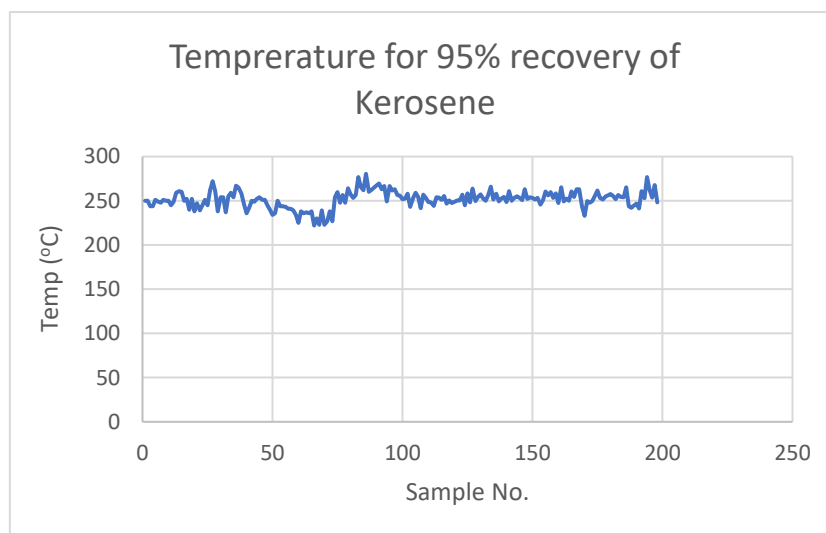


Fig 1 Graphical representation of 95 percent recovery of Kerosene

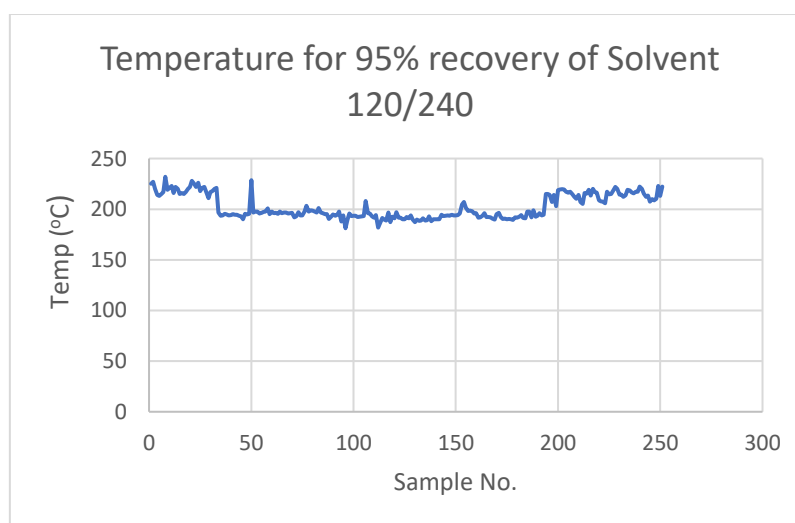


Fig 2 Graphical representation of 95 percent recovery of solvent 120/240

When compared the data of 95 percent recovery of both the kerosene and hydrocarbon solvent 120/240 is as given below:

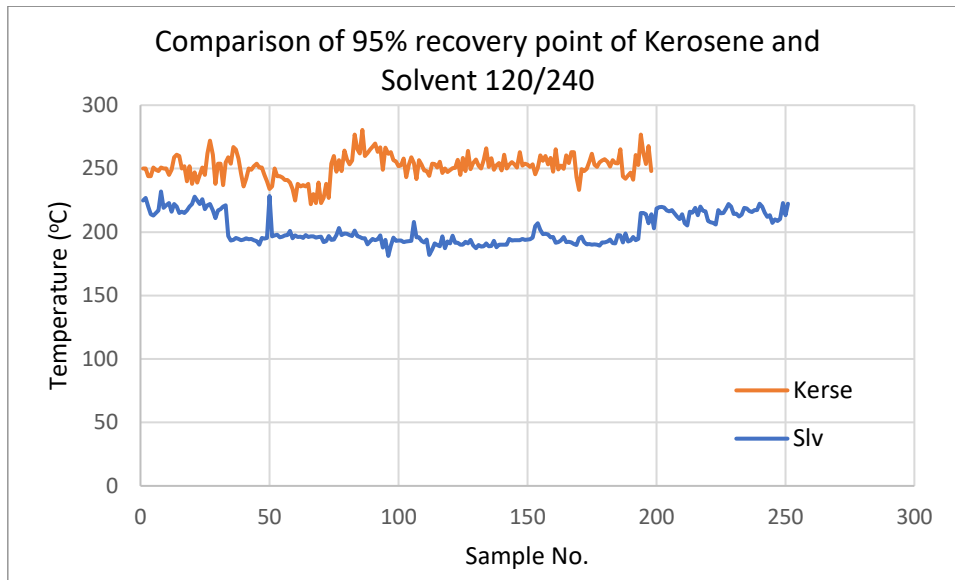


Fig 3 Comparative chart of 95 percent recovery of kerosene and hydrocarbon solvent 120/ 240

From the above graph the average values of 95percent recovery of Kerosene is 245°C and that of solvent 120/240 is 220°C.

II. The data was studied for its average values Final Boiling Point (FBP) of kerosene and solvent and the graphical representation is as follows:

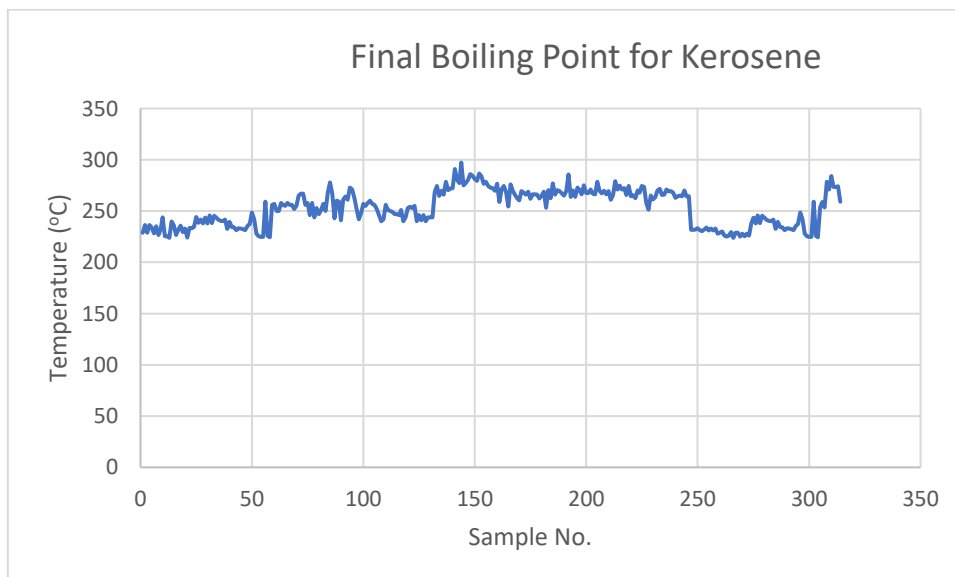


Fig 4 Comparison chart of Final Boiling Point (FBP) of Kerosene

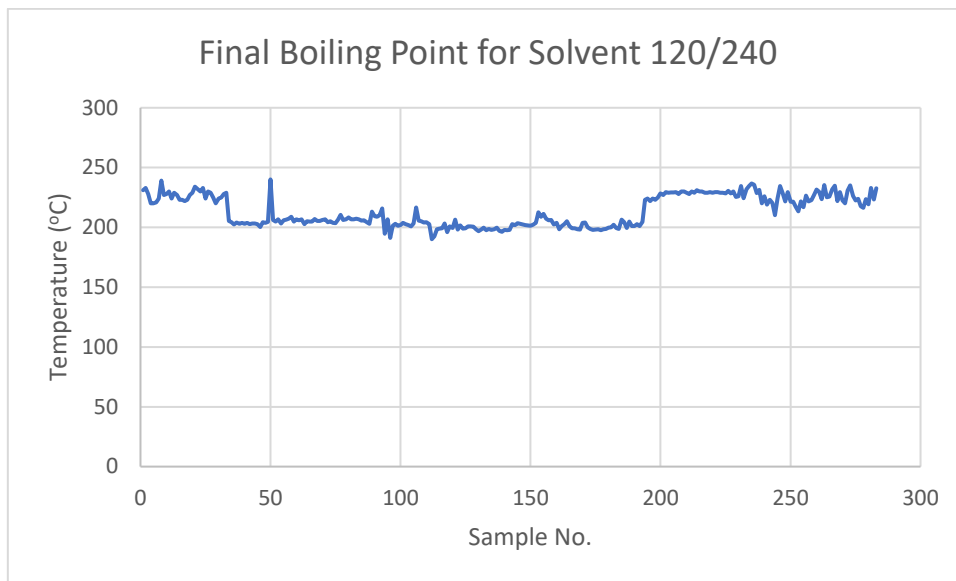


Fig 5 Graphical representation of Final Boiling Point (FBP) of solvent 120/240

When compared the data of Final Boiling Point (FBP) of both the kerosene and hydrocarbon solvent 120/ 240 is as given below:

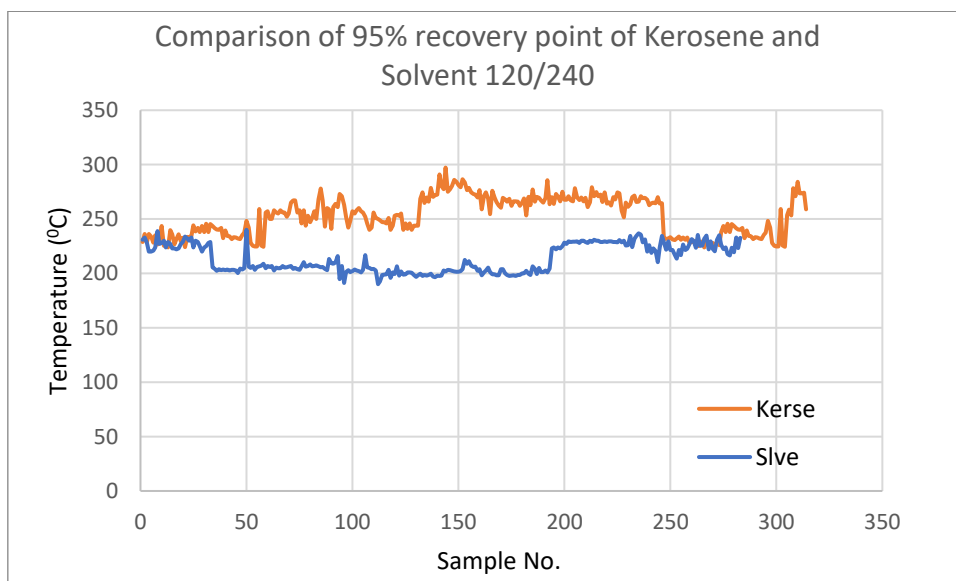


Fig 6 Comparative chart of Final Boiling Point (FBP) of kerosene and hydrocarbon solvent 120/ 240

From the above graph the average values of Final Boiling Point (FBP) of Kerosene is 250 °C and that of solvent 120/240 is 225 °C.

III. The data provided by all the oil companies was also verified for its normal distribution. The mean and standard deviation values for all the combined data provided by all oil companies is as follows:

Solvent 120/240 95 percent Recovery, Mean	202
Solvent 120/240 95 percent Recovery, St Dev	12
Kerosene 95 percent Recovery, Mean	251.4389
Kerosene 95 percent Recovery, St Dev	9.87709
Solvent FBP, Mean	213
Solvent FBP, St Dev	12.79603
Kerosene FBP, Mean	253
Kerosene FBP, St Dev	17.45828

The normal distribution of 95 percent recovery is plotted below:

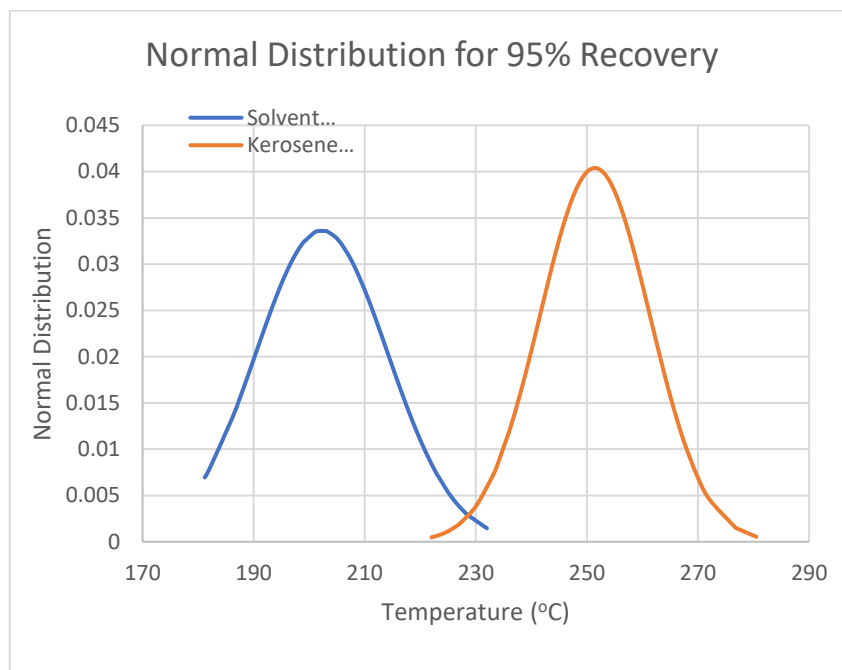


Fig 7 Normal Distribution for 95 percent recovery of Solvent 120/240 and Kerosene

It can be observed from the graph that for the normal distribution of 95 percent recovery points that only very few numbers of points overlap for Solvent 120/240 and Kerosene. As the standard deviation for Solvent 120/240 is 12°C and mean is 202°C, so following the distribution, more than 95 percent data points will lie between 178°C and 226°C and approximately 68 percent of point will lie between 190°C and 214°C, for Solvent 120/240. While for Kerosene, mean is 251.44°C and standard deviation is 9.88°C. Following the distribution, more than 95 percent data points will lie between 231.68°C and 271.2°C and approximately 68 percent of point will lie between 241.56°C and 261.32°C. So, the 95 percent recovery point can be taken as a parameter to differentiate Kerosene and Solvent 120/240, keeping a *Max* limit for 95 percent recovery point of Solvent 120/240 and *Min* limit for 95 percent recovery point of Kerosene.

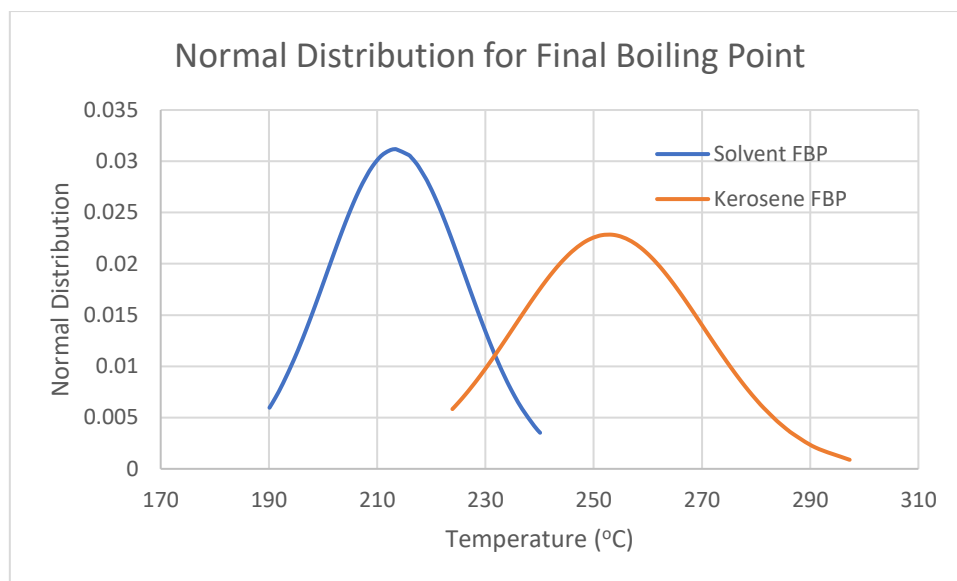


Fig 8 Normal Distribution for Final Boiling Point of Solvent 120/240 and Kerosene

It can be observed from the graph that for the normal distribution of final boiling points that a few numbers of points overlap for Solvent 120/240 and Kerosene. As the standard deviation for Solvent 120/240 is 12.8°C and mean is 213°C, so following the distribution, more than 95 percent data points will lie between 169.4°C and 238.6°C and approximately 68 percent of point will lie between 200.2°C and 225.8°C, for Solvent 120/240. While for Kerosene, mean is 253°C and standard deviation is 17.46°C. Following the distribution, more than 95 percent data points will lie between 218.08°C and 287.92°C and approximately 68 percent of point will lie between 235.54°C and 270.46°C. In the case of final boiling points, there is overlap in the range for (Mean-St Dev) and (Mean+St Dev), so it requires further investigation.

II WITNESSING THE SAMPLE TESTING

IOCL, BPCL and HPCL members have agreed to provide samples in the laboratories near by Delhi, due to existing Covid 19 pandemic. Testing of samples of was witnessed in the quality control laboratories of IOC Panipat Refinery, BPCL Bijwasan, Delhi and HPCL Tikri Kalan, Delhi. The requirements measured were density at 15 °C, distillation characteristics, flash point, sulphur content, aromatic content and colour (Saybolt method). The test reports data is given below:

1. BPCL Bijwasan

Sl. No	Parameter	Unit	Method	SKO T-01	SKO T-20	MTO TK-02	MTO TK-17
1	Density at 15 °C	gm/ml	IS 1448 (Part 16)	0.7835	0.7842	0.7884	0.7894
	Distillation		IS 1448 (Part 18) (Auto)				
2	Initial Boiling Point	°C		154.9	154.1	153.8	152.9
3	5 percent volume	°C		164.8	164.4	163.7	164.1
4	10 percent volume	°C		166.1	166.1	165.1	165.4
5	15 percent volume	°C		167	167.3	166.4	166.8
6	20 percent volume	°C		167.7	168.4	167.5	167.7

7	30 percent volume	°C		169.1	170.2	169.6	170
8	40 percent volume	°C		171	172.4	172	172.5
9	50 percent volume	°C		173.1	175	174.3	175.1
10	60 percent volume	°C		175.4	178.2	176.9	177.7
11	70 percent volume	°C		178.5	182.2	179.8	180.6
12	80 percent volume	°C		183	188.5	183.1	184.2
13	85 percent volume	°C		186.4	193.5	185.3	186.5
14	90 percent volume	°C		191.3	201.4	188.1	189.6
15	95 percent volume	°C		202.2	220.4	192.4	194.3
16	Final Boiling Point	°C		229.6	246.6	201.6	202.5
17	Recovery	volume percent		98.5	97.7	99.4	98.5
18	Flash Point	°C	IS 1448 (Part 20)	41	39.5	41.5	40
19	Total Sulphur	ppm	D4294	190	454	121	119
20	Saybolt Colour		IS 1448 (Part 14)	28	26	28	30
21	Aromatics	volume percent	IS 1448 (Part 23)	11.2	11.5	15.3	16.4
22	Smoke Point	mm	IS 1448 (Part 31)	27	27	25	25

2. IOCL Panipat

Sl. No.	Parameter	Unit	Method	MTO TK 10A 11 Nov 2020 (1)	MTO TK 10A 11 Nov 2020 (2)	TK-52 08 Sept 2020 (1)	TK-52 08 Sept 2020 (2)
1	Density at 15 °C	gm/ml	D4052	0.7889	0.7894	0.7997	0.8005
	Distillation		IS 1448 (Part 18)				
2	Initial Boiling Point	°C		171		168	167
3	5 percent volume	°C		175		174	173
4	10 percent volume	°C		176		176	176
5	40 percent volume	°C		179		186	183
6	50 percent volume	°C		182		193	192
7	70 percent volume	°C		185		201	203
8	85 percent volume	°C		187		216	216
9	90 percent volume	°C		188		223	223
10	95 percent volume	°C		192		234	234
11	Final Boiling Point	°C		202		242	245
12	Flash Point	°C	IS 1448 (Part 20)	50.5	50	48.5	48.5
13	Total Sulphur	ppm	D4294	718	713	648	569
14	Saybolt Colour		D6045	21	21	13	14
15	Aromatics	volume percent	IS 1448 (Part 23)	17.3			

3. HPCL Tikri Kalan

Sl. No.	Parameter	Unit	Method	Solvent 125/240 TK 04/06 March 2021	SKO TK 15 06 March 2021
1	Density at 15 °C	gm/ml	IS 1448 (Part 16)	0.7969	0.7894
	Distillation		IS 1448 (Part 18)		
2	Initial Boiling Point	°C		147	161
3	5 percent volume	°C		163	168
4	10 percent volume	°C		167.5	169.5
5	40 percent volume	°C		182.5	177.5
6	50 percent volume	°C		186.5	180.5
7	70 percent volume	°C		195	188.5
8	85 percent volume	°C		204	199.5
9	90 percent volume	°C		208	206
10	95 percent volume	°C		214	219
11	Final Boiling Point	°C		224	251
12	Flash Point	°C	IS 1448 (Part 20)	38	45
13	Total Sulphur	ppm	D4294	130.5	1178
14	Saybolt Colour		D6045	23	21
15	Aromatics	volume percent	IS 1448 (Part 23)	20.6	19.5

The data after compilation, for each requirement is as follows:

Sl. No	Sample	Density at 15 °C (gm/ml)	Flash Point (°C)	Final Boiling Point (°C)	95 percent recovery (°C)	90 percent recovery (°C)	Total Sulphur (ppm)	Colour (Saybolt)	Aromatics (volume percent)	Smoke point (in mm)
1	SKO T-20, BPCL	0.7842	39.5	229.6	220.4	201.4	454	26	11.5	27
2	SKO T-01, BPCL	0.7835	41	246.6	202.2	191.3	190	28	11.2	27
3	SKO TK 15 06 March 2021, HPCL	0.7894	45	251	219	216	1178	21	19.5	
4	TK-52 08 Sept 2020 (1), IOCL	0.7997	48.5	242	234	223	648	13		
5	TK-52 08 Sept 2020 (2), IOCL	0.8005	48.5	245	234	223	569	14		

1	Solvent 125/240 TK 04/06 March 2021, HPCL	0.7969	38	224	214	208	130.5	23	20.6	
2	MTO TK- 17, BPCL	0.7894	40	202.5	194.3	189.6	119	30	16.4	25
3	MTO TK- 02, BPCL	0.7884	41.5	201.6	192.4	188.1	121	28	15.3	25
4	MTO TK 10A 11 Nov 2020 (2), IOCL	0.7894	50				713	21		
5	MTO TK 10A 11 Nov 2020 (1), IOCL	0.7889	50.5	202	192	188	718	21	17.3	

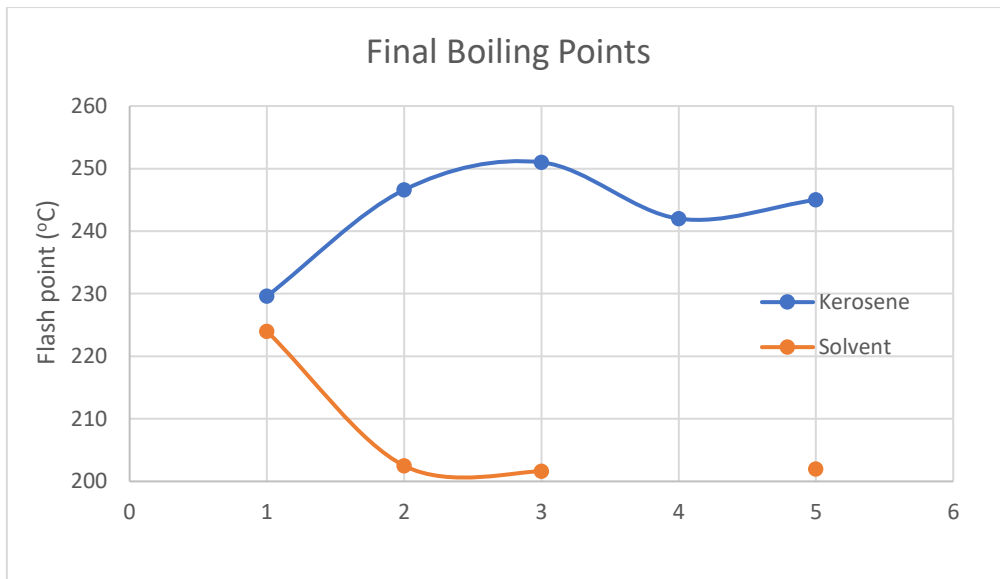
Observations from the above data

The samples are designated as follows in the following graphs:

Sl. No		Sample
1	Kerosene	SKO T-20, BPCL
2		SKO T-01, BPCL
3		SKO TK 15 06 March 2021, HPCL
4		TK-52 08 Sept 2020 (1), IOCL
5		TK-52 08 Sept 2020 (2), IOCL
1	Solvent	Solvent 125/240 TK 04/06 March 2021, HPCL
2		MTO TK-17, BPCL
3		MTO TK-02, BPCL
4		MTO TK 10A 11 Nov 2020 (2), IOCL
5		MTO TK 10A 11 Nov 2020 (1), IOCL

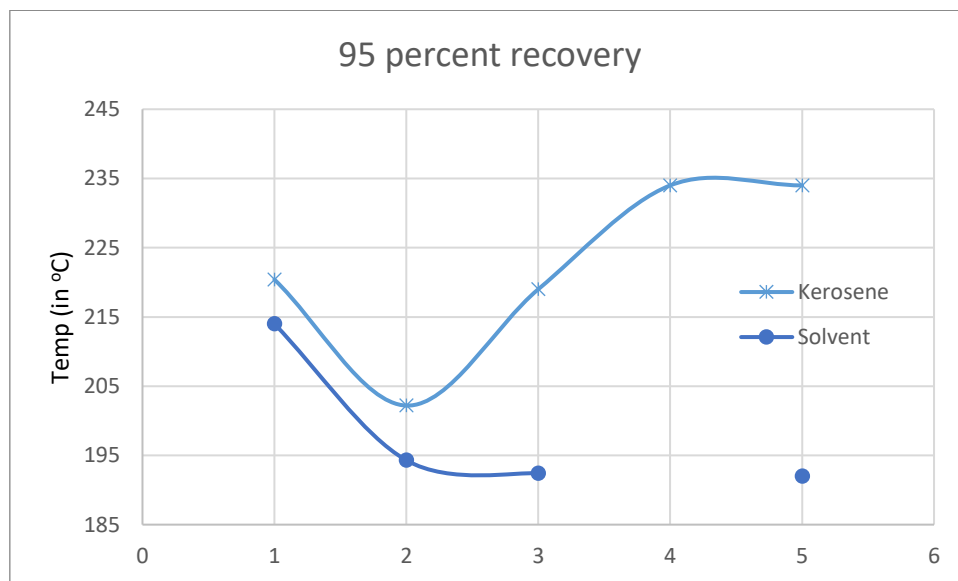
1. Final Boiling Point

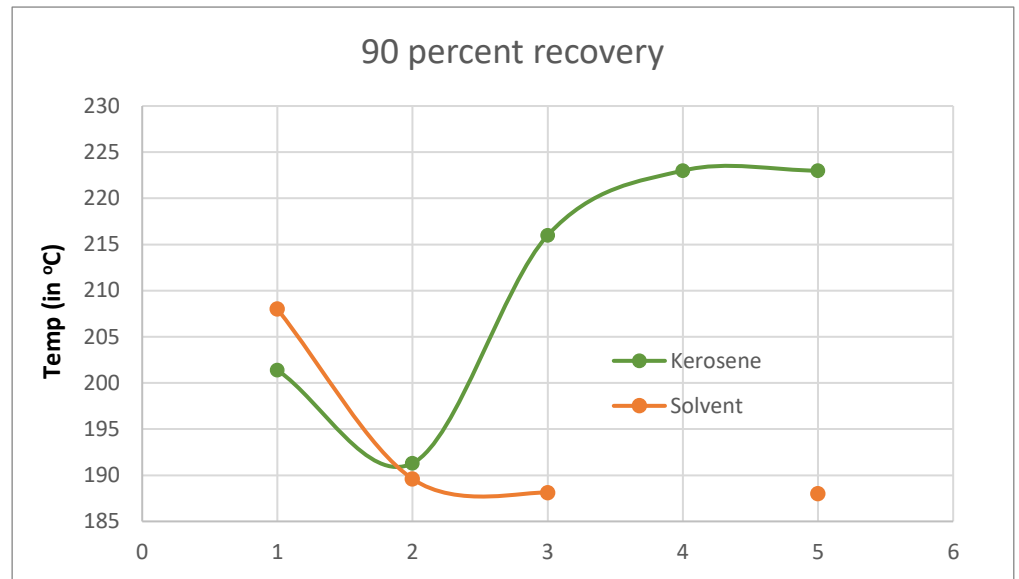
Final boiling points of sample drawn from BPCL (Sample 1 & 2) are somewhat closer, although the range do not overlap. For samples drawn from HPCL and IOCL, final boiling point of Kerosene samples lie within the range of 240-255 °C and for solvent samples, it is within a range of 200-210 °C.



2. 90 & 95 percent recovery

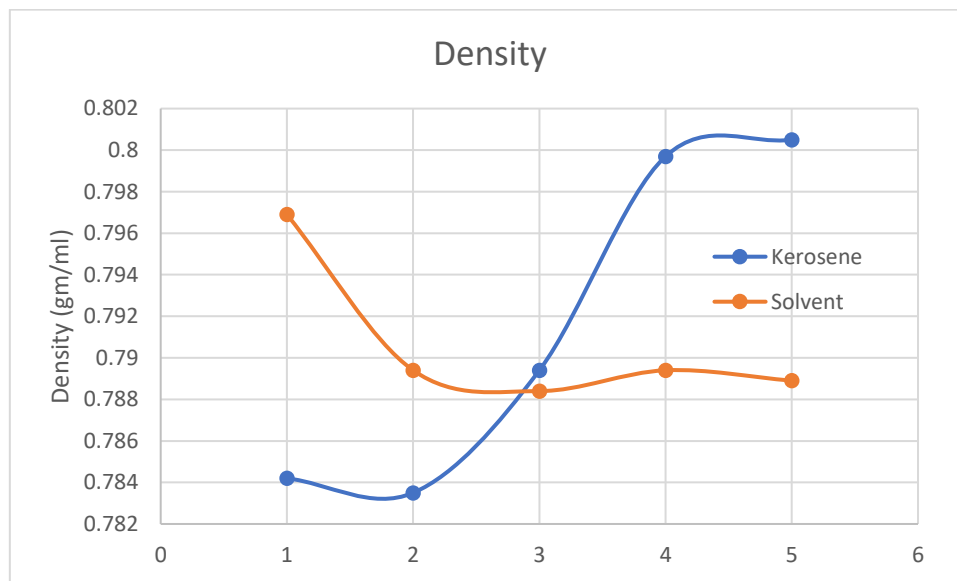
There is overlap for 90 and 95 percent recovery points of kerosene and solvent for samples drawn from BPCL. However, there is significant gap between 90 and 95 percent recovery points for sample drawn from HPCL and IOCL, as shown in the figures below:





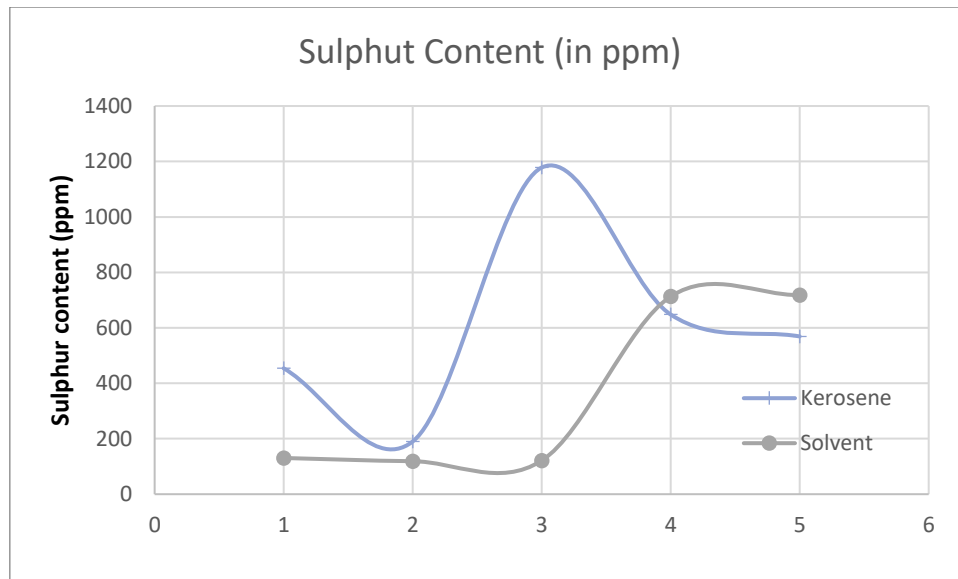
3. Density

There is huge variation in the density of samples drawn from different sources, so it is rather difficult limit the requirement of density.



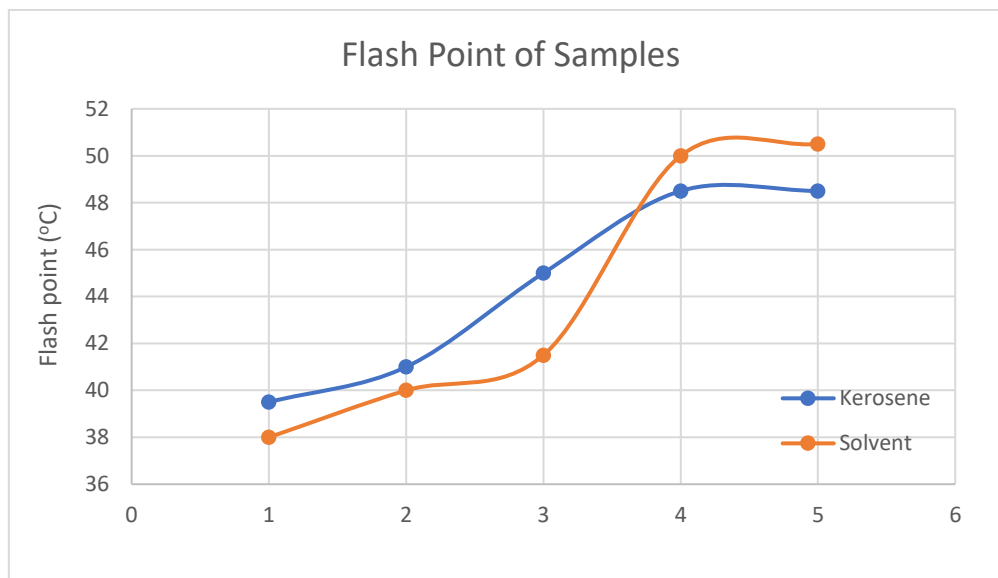
4. Sulphur Content

The sulphur content of samples drawn from HPCL is unusually high at 1178 ppm, for rest of the samples, sulphur content data of the solvent and kerosene overlap.



5. Flash point

Flash points of sample drawn from any source are close, but they are higher than the requirements specified in IS 1459 and IS 1750, i.e., 35 °C and 30 °C respectively.



FINAL OBSERVATION

1. After obtaining the normal distribution of data provided by oil companies, it was observed that the values for 95 percent recovery points, more than 95 percent data points lie between 178°C and 226°C for Solvent 120/240 and more than 95 percent data points lie between 231.68°C and 271.2°C for Kerosene. So, to differentiate between Solvent 120/240 and Kerosene, a *Max* limit for 95 percent recovery point for Solvent 120/240 and *Min* limit for 95 percent recovery point of Kerosene are recommended.
2. The values of 95percent recovery and sulphur content may be considered for inclusion in IS 1745 Petroleum hydrocarbon solvent, grade 120/240, as they may help in differentiating kerosene (IS 1459) and solvent (IS 1745).
3. Also, any further requirements that can define to differentiate the kerosene (IS 1459) and solvent (IS 1745) need to be discussed by the Committee.