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APPLICATION NOTE 205WA0809G

# **SIMDIST Analysers**

**ASTM 2887  
7169  
6352  
7213  
and others**

## Introduction

Simulated distillation (Simdist) is a GC based method for the characterization of petroleum products, fractions, lube oil and crude oil. Simdist determines the boiling range distribution in a quick, automated and reliable way. This method replaces the laborative and dangerous D86/1160 methods. True boiling point (TBP) data is vital information for improving refinery profit margins.

Samples are analysed on a non polar column, separating hydrocarbons in boiling point order. Boiling points are correlated with retention time from a range of n-alkanes eluting under exact the same conditions and in the range of the sample. A blank analysis is subtracted from the sample chromatogram in order to correct for column bleeding. It is of great importance that the GC instrument has a very good run to run reproducibility.

Results are reported as a correlation between boiling points and percentages of the sample eluted from the column. The results are confirmed by running a well known reference sample. The Simdist data correlates with ASTM D86 or D1160.

The determination of boiling point distribution of petroleum products and crude's by conventional GC is a rapid and reliable tool, which is widely used to replace conventional distillation methods. This proven technology is supported by several standardised methods.

## Published methods and software

SUPPORTED STANDARDISED METHODS				
Method	ASTM D7096 ASTM D 3710	ASTM D2887 IP 406	ASTM D6417 ASTM D7213	ASTM D6352 ASTM D7169 ASTM D7500 ASTM D5307 IP 480/507/ 545 EN 15.199-1,2,3 DIN 51435
Up to Carbon number	C16	C44	C60	C90 / C120
Sample Type	Gasoline Naphta	Jet Fuel Diesel Fuel	Lube Oil Base- Stocks	Lube Oil Base- Stocks Heavy Dest. Residues Crude Oil

Table 1: list of standardised methods

The fully automated solution for Simdist enables you to generate TBP data according to international reference methods. Table 1 shows an overview of the supported standardised methods, including sample type and boiling point range. Ultra Fast Simdist is also implemented in the software, see figure 1. All method parameters are clearly arranged using tab pages, see figure 2.

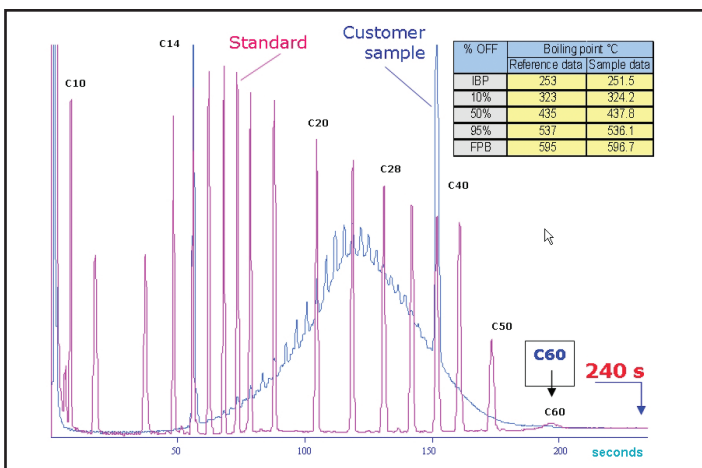


Figure 1: Ultra Fast Simdist is supported as well

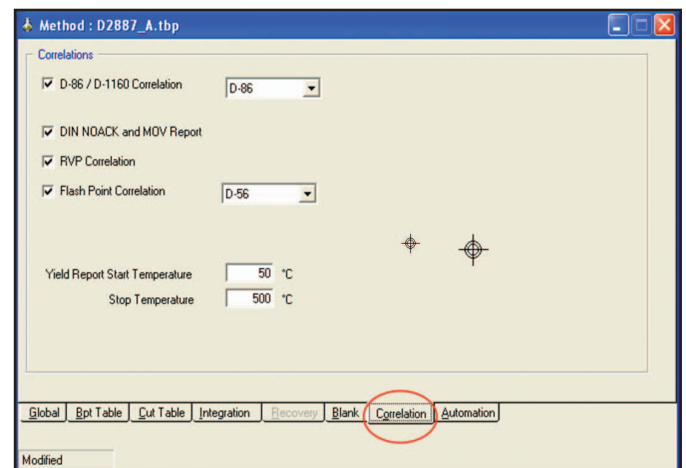


Figure 2: Several correlations available

# Reporting and hardware solutions

Simdist reporter provides several correlations such as :

- ASTM D86 and D1160, giving you the correlation for respectively atmospheric and vacuum distillation of your samples.
- DIN 51.581 (NOACK) is reporting the evaporative loss in mass% of lubricants at 250°C.
- ASTM D 6417 (MOV) is reporting the evaporation loss in mass% of lubricants at 371°C.
- ASTM D54 Reid vapor pressure (RVP) is reported for samples analysed according.
- Correlation to ASTM D56, reports Flashpoints of the various methods used.
- Cut point tables can be user added to the Simdist report when required.

Besides the boiling point distribution report (table 2), a quality control report is available as well. This report shows the conformity with reference samples, and is therefore very important for the overall reliability of the method. See table 3: 'LIM' shows the allowed deviation, while 'DIF' is the actual difference.

## Available hardware solutions:

- Thermo Trace 1300 GC with InstantConnect injector modules (SSL or PTV) and InstantConnect detector module (FID). Triplus RSH or AI/AS 1310 autosamplers.
- PTV including Backflush, for light-end Simdist of heavy oil and crude oil.



Picture 1: easy InstantConnect injector/detector exchange

## Simdist application package including:

- Set of standards, Polywax (500, 655 or 1000) or hydrocarbon mix according to the required method to set the Boiling point distribution vs retention time.
- External reference sample, for quantification and performance verification.
- Analytical column, Mxt 2887, Mxt 2887 extended, ASTM 3710

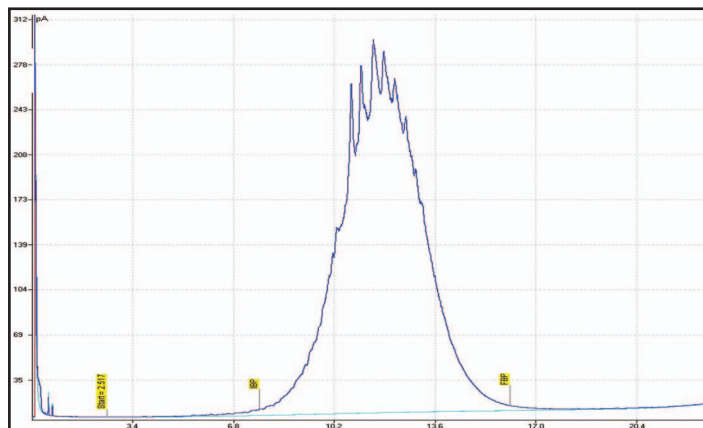


Figure 3: sample chromatogram

Simdist - EzChrom Elite ASTM D 6352		GLOBAL™ ANALYSER SOLUTIONS G·A·S	
Sample Name	Ref	Sample Wt	0.8000
Sample Type	Sample	Dilution	1.0000
Date Analysed	7/9/2009 1:42:08 PM		
Analyst	Interscience\install		
Data File	\\Isn-server01\apps\Elite-Admin\Projects\SAO BK\Data\D090709_D6352_04.dat		
Method	D6352.met		
Description			
Instrument	Simdist 6352		
Blank	\\Isn-server01\apps\Elite-Admin\Projects\SAO BK\Data\D090709_D6352_02.dat		
Calibration	\\Isn-server01\apps\Elite-Admin\Projects\SAO BK\Data\D090709_D6352_01.dat		
Control Analysis	\\Isn-server01\apps\Elite-Admin\Projects\SAO BK\Data\D090709_D6352_04.dat		
Control Status			
StartTime	0.4667	Total Area	5.21112 E+05
EndTime	17.2167		
Distribution report			
% OFF	TBP °C	% OFF	TBP °C
IBP	372.9	26	440.5
1	384.9	27	441.9
2	396.1	28	442.7
3	407.2	29	443.4
4	407.2	30	444.2
5	410.9	31	444.9
6	413.9	32	445.6
7	416.1	33	446.4
8	418.3	34	447.1
9	420.5	35	447.8
10	422.0	36	448.6
11	423.5	37	450.1
12	425.7	38	450.8
13	426.5	39	451.5
14	427.9	40	451.9
15	429.4	41	453.0
16	430.9	42	453.7
17	432.4	43	454.5
18	433.1	44	455.2
19	434.6	45	455.9
20	435.3	46	456.7
21	436.1	47	457.4
22	436.8	48	458.2
23	437.5	49	458.9
24	439.0	50	459.6
25	439.7	51	460.4
52	461.1	52	461.1
53	461.8	53	461.8
54	462.6	54	462.6
55	463.3	55	463.3
56	464.1	56	464.1
57	464.8	57	464.8
58	465.5	58	465.5
59	466.2	59	466.2
60	466.9	60	466.9
61	467.6	61	467.6
62	468.3	62	468.3
63	469.0	63	469.0
64	469.7	64	469.7
65	470.4	65	470.4
66	471.1	66	471.1
67	471.7	67	471.7
68	473.1	68	473.1
69	473.8	69	473.8
70	474.5	70	474.5
71	475.2	71	475.2
72	475.9	72	475.9
73	476.5	73	476.5
74	477.9	74	477.9
75	478.6	75	478.6
76	479.3	76	479.3
77	480.0	77	480.0
78	481.4	78	481.4
79	482.1	79	482.1
80	483.5	80	483.5
81	484.3	81	484.3
82	485.0	82	485.0
83	486.4	83	486.4
84	487.9	84	487.9
85	488.6	85	488.6
86	490.1	86	490.1
87	491.5	87	491.5
88	493.0	88	493.0
89	494.4	89	494.4
90	495.9	90	495.9
91	497.9	91	497.9
92	499.2	92	499.2
93	501.2	93	501.2
94	503.8	94	503.8
95	506.5	95	506.5
96	509.1	96	509.1
97	513.2	97	513.2
98	518.7	98	518.7
99	527.4	99	527.4
FBP	535.3	FBP	535.3
TBP Recovery %:	100.0		

Table 2: sample report

Quality Control Report				
Passed on 7/9/2009 1:42:08 PM				
mass%	TBP °C	REF °C	LIM °C	DIF °C
IBP	367.6	366.0	8.0	1.6
10	422.0	421.5	5.0	0.5
20	434.9	436.0	3.0	-1.1
30	444.1	445.5	3.0	-1.4
40	452.3	454.0	3.0	-1.7
50	459.6	462.0	3.0	-2.4
60	466.9	469.5	3.0	-2.6
70	474.8	477.5	3.0	-2.7
80	483.5	486.0	3.0	-2.5
90	496.9	498.0	5.0	-1.1
FBP	548.4	544.5	8.0	3.9

Table 3: Quality Control Report

# SPECIFICATIONS

## Hardware

**Configuration:** 1 or 2 channel instrument based on Thermo Trace 1300GC, with InstantConnect SSL or PTV injector module, InstantConnect FID detector module, Triplus RSH or AS/AI-1310 liquid autosamplers

**Optional:** Cryogenic oven cooling (liquid N<sub>2</sub> or liquid CO<sub>2</sub>)

**Application:** Custom configured analyser for light hydrocarbon products up to crude oil, lube oil and residual samples  
Simdist analyser tuned for applications according to the standardised methods.

**Sample requirements:** Neat or dissolved in CS<sub>2</sub>.  
(safety issue: CS<sub>2</sub> is extremely flammable and toxic).

**Analysis time:** Depending on configurations, 2-35 minutes.

**Software** Simdist Reporter for EZChrom/Open Lab/ChromQuest.



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