Summary of laboratory means

sample 1

Laboratory	n-Hexane	Z score	n-Octane	Z score	n-Propyl acetate	Z score
Unit	mg/tube		mg/tube		mg/tube	
–	–	– –	–	– –	–	– –
38	0,681	0,313	0,413	0,650	0,210	0,384
68	0,656	-0,066	0,398	0,263	0,196	-0,308
79	0,661	0,004	0,388	-0,005		
82	0,689	0,434	0,395	0,186	0,218	0,779
85	0,604	-0,853				
118	0,630	-0,466	0,370	-0,469	0,200	-0,101
125						
128						
131	0,625	-0,535	0,362	-0,665	0,207	0,236
135	0,610	-0,764	0,358	-0,756	0,197	-0,244
162	0,674	0,208	0,403	0,402	0,179	-1,144
195	0,808	2,230 E	0,375	-0,327	0,089	-5,584 BE
202	0,661	0,013	0,391	0,088	0,240	1,867
224	0,681	0,313	0,413	0,650	0,206	0,186
262	0,655	-0,081	0,393	0,134	0,195	-0,358
272	0,611	-0,747	0,382	-0,150	0,176	-1,297
–	–	– –	–	– –	–	– –
Method	ISO 5725		ISO 5725		ISO 5725	
Assessment	|Z|<=2,000		|Z|<=2,000		|Z|<=2,000	
Mean	0,660		0,388		0,202	
Reproducibility s.d.	0,051		0,018		0,018	
Rel. reproducibility s.d.	7,74 %		4,56 %		8,73 %	
Reference value	0,658		0,397		0,214	
Target s.d.	0,066		0,039		0,020	

Laboratory	n-Hexane	Z score	n-Octane	Z score	n-Propyl acetate	Z score
Rel. target s.d.	10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,528		0,310		0,162	
Upper limit of tolerance	0,792		0,465		0,243	
Type B outliers	0		0		1	
Type E outliers	1		0		1	
Type F outliers	0		0		0	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	14		13		11	

Explanation of outlier types

A: Single outlier

B: Differing laboratory mean

C: excessive laboratory s.d.

D: Excluded manually

E: score outside tolerance limits

F: |Score|>3,5

Summary of laboratory means

sample 2

Laboratory	o-Xylene	Z score	n-Heptane	Z score	n-Octane	Z score	Ethylbenzene	Z score
Unit	mg/tube		mg/tube		mg/tube		mg/tube	
–	–	– –	–	– –	–	– –	–	– –
38	0,080	0,214	0,363	-0,384	0,393	0,139	0,139	0,362
68	0,080	0,214	0,387	0,251	0,392	0,113	0,142	0,586
79	0,087	1,095	0,391	0,344	0,391	0,085	0,137	0,191
82	0,076	-0,297	0,390	0,331	0,392	0,113	0,119	-1,129
85	0,084	0,725					0,141	0,511
118	0,073	-0,731	0,358	-0,511	0,348	-1,014	0,124	-0,734
125	0,086	0,980					0,144	0,735
128	0,071	-0,935					0,129	-0,383
131	0,077	-0,169	0,365	-0,331	0,356	-0,816	0,127	-0,533
135	0,075	-0,466	0,351	-0,710	0,354	-0,860	0,128	-0,488
162	0,073	-0,680	0,388	0,270	0,392	0,103	0,130	-0,294
195	0,068	-1,292	0,381	0,098	0,397	0,247	0,131	-0,242
202	0,085	0,827	0,402	0,657	0,413	0,650	0,142	0,556
224	0,079	0,086	0,386	0,225	0,383	-0,119	0,134	-0,011
262	0,083	0,597	0,364	-0,358	0,433	1,171	0,140	0,437
272	0,077	-0,169	0,382	0,119	0,395	0,190	0,140	0,437
–	–	– –	–	– –	–	– –	–	– –
Method	ISO 5725		ISO 5725		ISO 5725		ISO 5725	
Assessment	|Z|<=2,000		|Z|<=2,000		|Z|<=2,000		|Z|<=2,000	
Mean	0,078		0,378		0,388		0,134	
Reproducibility s.d.	0,006		0,015		0,023		0,007	
Rel. reproducibility s.d.	7,18 %		4,10 %		6,06 %		5,55 %	
Reference value	0,082		0,379		0,383		0,139	
Target s.d.	0,008		0,038		0,039		0,013	

Laboratory	o-Xylene	Z score	n-Heptane	Z score	n-Octane	Z score	Ethylbenzene	Z score
Rel. target s.d.	10,00 %		10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,063		0,302		0,310		0,107	
Upper limit of tolerance	0,094		0,453		0,465		0,161	
Type B outliers	0		0		0		0	
Type E outliers	0		0		0		0	
Type F outliers	0		0		0		0	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	16		13		13		16	

Explanation of outlier types

A: Single outlier

B: Differing laboratory mean

C: excessive laboratory s.d.

D: Excluded manually

E: score outside tolerance limits

F: |Score|>3,5

Summary of laboratory means

sample 3

Laboratory	o-Xylene	Z score	Toluene	Z score	Ethylbenzene	Z score
Unit	mg/tube		mg/tube		mg/tube	
–	–	– –	–	– –	–	– –
38	0,140	0,746	0,696	0,209	0,144	0,635
68	0,133	0,208	0,685	0,048	0,143	0,561
79	0,139	0,661	0,701	0,285	0,136	0,073
82	0,125	-0,406	0,670	-0,172	0,130	-0,399
85	0,139	0,669	0,697	0,224	0,144	0,635
118	0,126	-0,329	0,663	-0,278	0,129	-0,503
125	0,148	1,360	0,698	0,238	0,150	1,078
128	0,114	-1,250	0,666	-0,231	0,133	-0,178
131	0,128	-0,176	0,663	-0,275	0,128	-0,547
135	0,125	-0,421	0,651	-0,454	0,129	-0,488
162	0,119	-0,828	0,665	-0,250	0,128	-0,532
195	0,119	-0,843	0,726	0,652	0,130	-0,370
202	0,137	0,500	0,693	0,160	0,139	0,243
224	0,135	0,362	0,680	-0,026	0,138	0,192
262	0,127	-0,252	0,673	-0,128	0,130	-0,399
272	0,044	-6,623 BE	0,315	-5,380 BE	0,048	-6,455 BE
–	–	– –	–	– –	–	– –
Method	ISO 5725		ISO 5725		ISO 5725	
Assessment	|Z|<=2,000		|Z|<=2,000		|Z|<=2,000	
Mean	0,130		0,682		0,135	
Reproducibility s.d.	0,009		0,020		0,007	
Rel. reproducibility s.d.	7,18 %		2,94 %		5,31 %	
Reference value	0,134		0,706		0,138	
Target s.d.	0,013		0,068		0,014	

Laboratory	o-Xylene	Z score	Toluene	Z score	Ethylbenzene	Z score
Rel. target s.d.	10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,104		0,545		0,108	
Upper limit of tolerance	0,156		0,818		0,162	
Type B outliers	1		1		1	
Type E outliers	1		1		1	
Type F outliers	0		0		0	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	15		15		15	

Explanation of outlier types

A: Single outlier

B: Differing laboratory mean

C: excessive laboratory s.d.

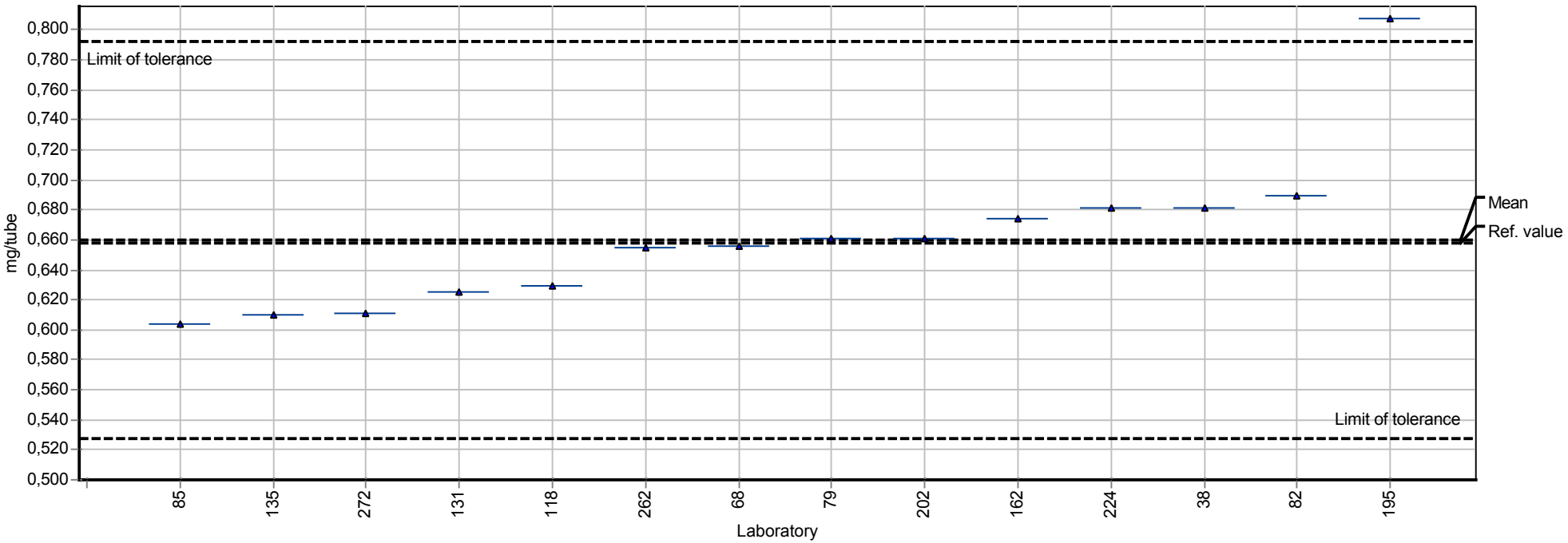
D: Excluded manually

E: score outside tolerance limits

F: |Score|>3,5

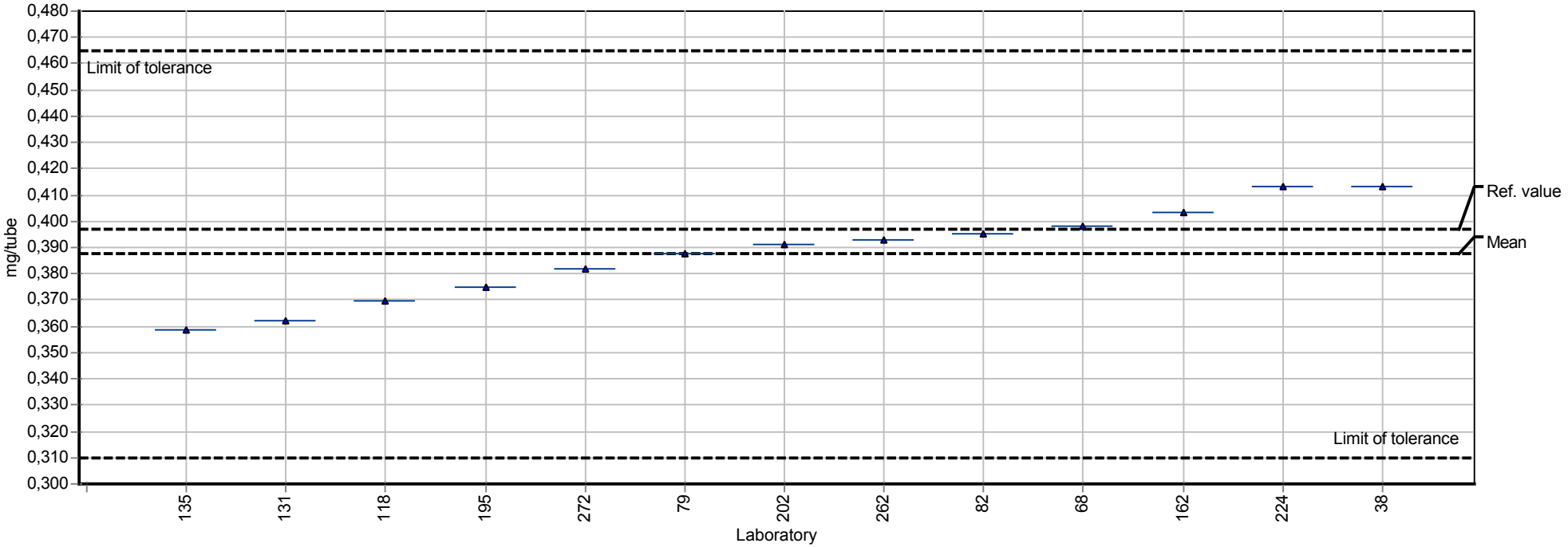
Summary results

Measurand:	**n-Hexane**	**Mean:**	**0,660 mg/tube**
Sample:	**sample 1**	**Reproducibility s.d.:**	**0,051 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**7,74%**
No. of laboratories:	**14**	**Tolerance limits:**	**0,528 - 0,792 mg/tube (|Z score| < 2,00)**



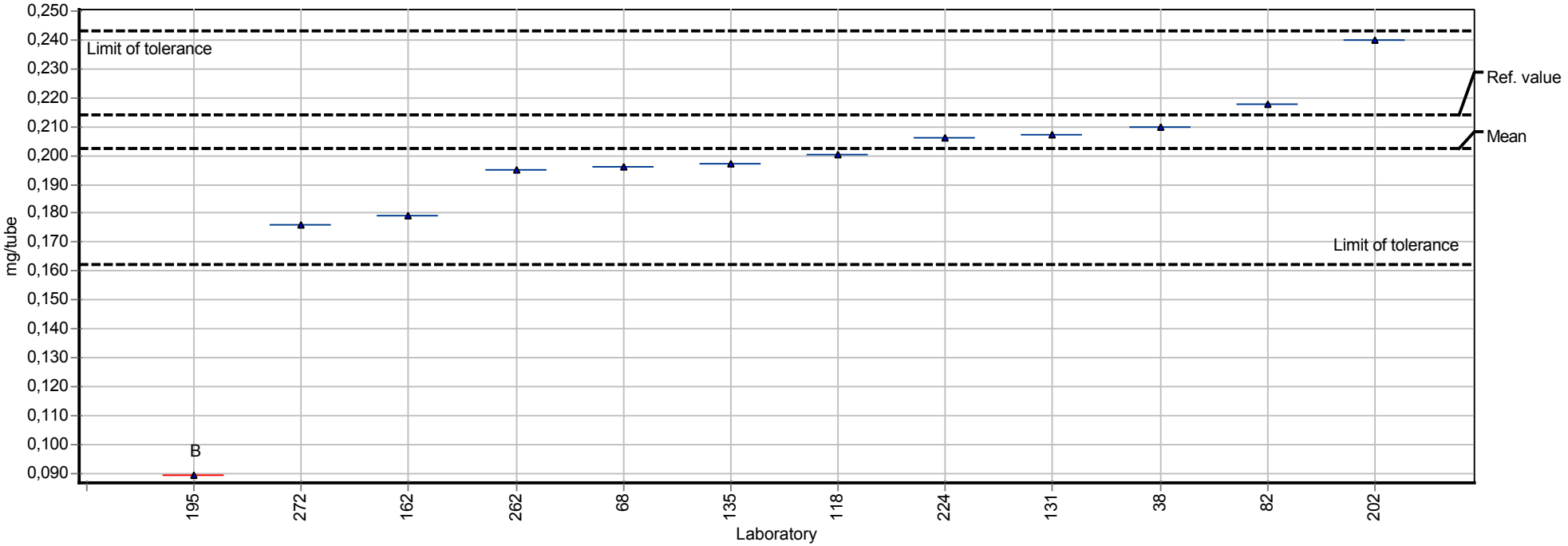
Summary results

Measurand:	**n-Octane**	**Mean:**	**0,388 mg/tube**
Sample:	**sample 1**	**Reproducibility s.d.:**	**0,018 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**4,56%**
No. of laboratories:	**13**	**Tolerance limits:**	**0,310 - 0,465 mg/tube (|Z score| < 2,00)**



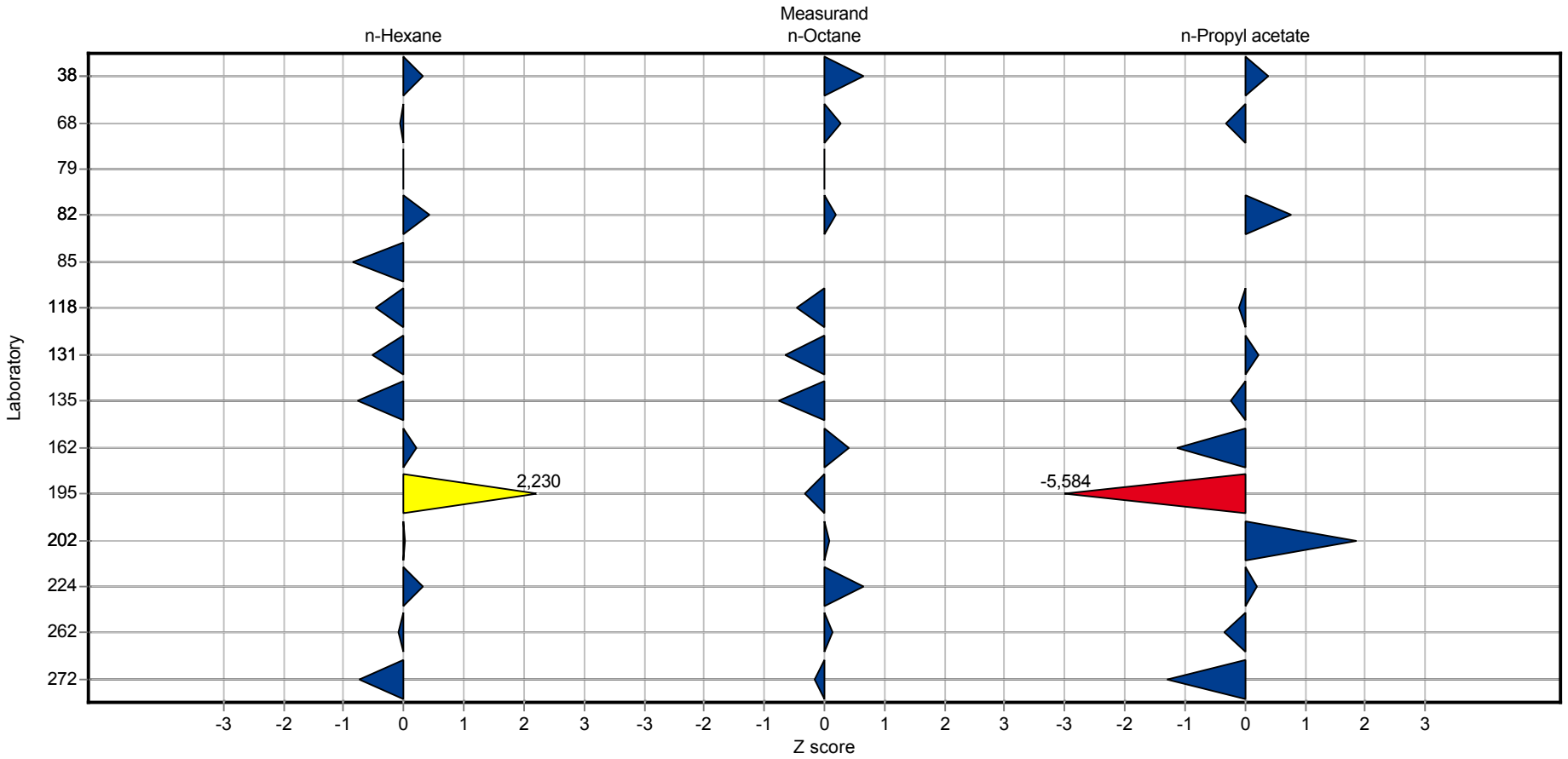
Summary results

Measurand:	**n-Propyl acetate**	**Mean:**	**0,202 mg/tube**
Sample:	**sample 1**	**Reproducibility s.d.:**	**0,018 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**8,73%**
No. of laboratories:	**11**	**Tolerance limits:**	**0,162 - 0,243 mg/tube (|Z score| < 2,00)**



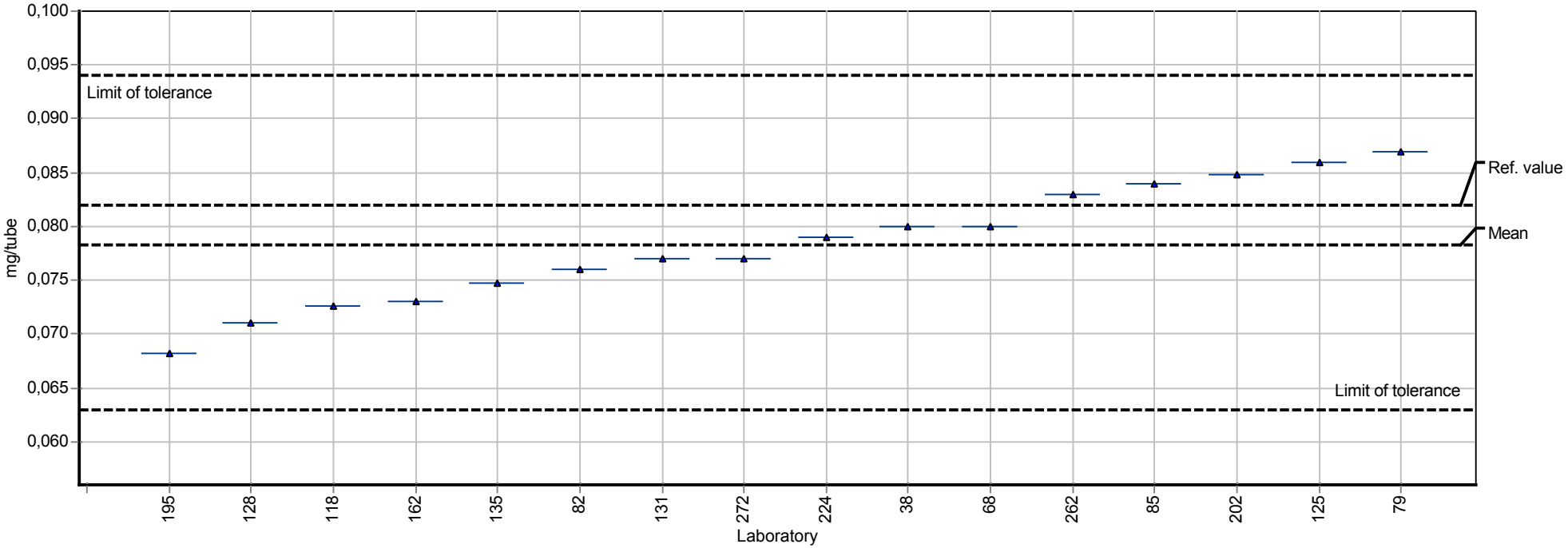
Sample chart of Z scores

Sample: 1



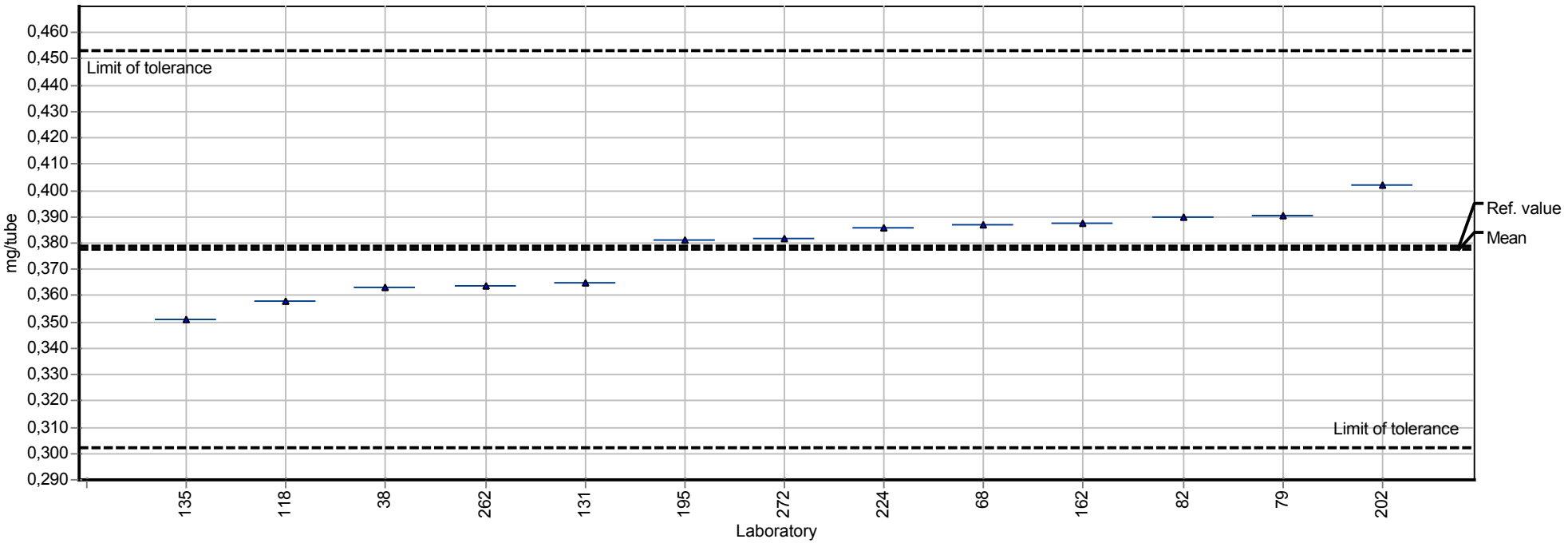
Summary results

Measurand:	**o-Xylene**	**Mean:**	**0,078 mg/tube**
Sample:	**sample 2**	**Reproducibility s.d.:**	**0,006 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**7,18%**
No. of laboratories:	**16**	**Tolerance limits:**	**0,063 - 0,094 mg/tube (|Z score| < 2,00)**



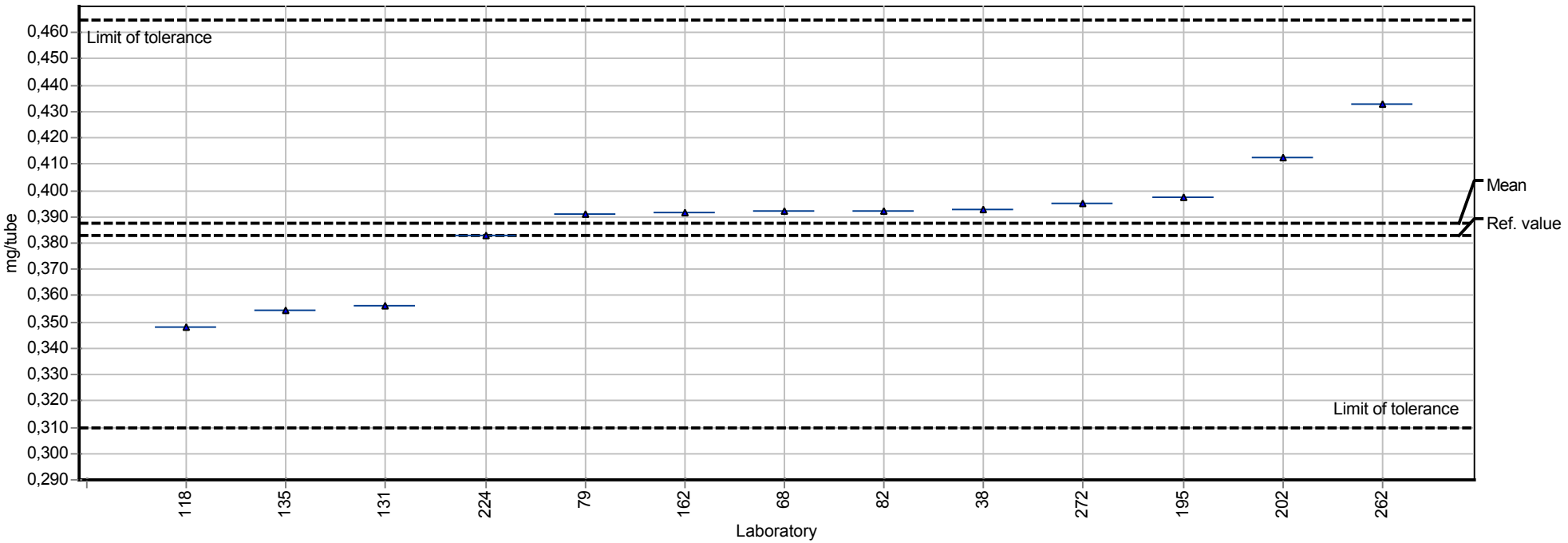
Summary results

Measurand:	**n-Heptane**	**Mean:**	**0,378 mg/tube**
Sample:	**sample 2**	**Reproducibility s.d.:**	**0,015 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**4,10%**
No. of laboratories:	**13**	**Tolerance limits:**	**0,302 - 0,453 mg/tube (|Z score| < 2,00)**



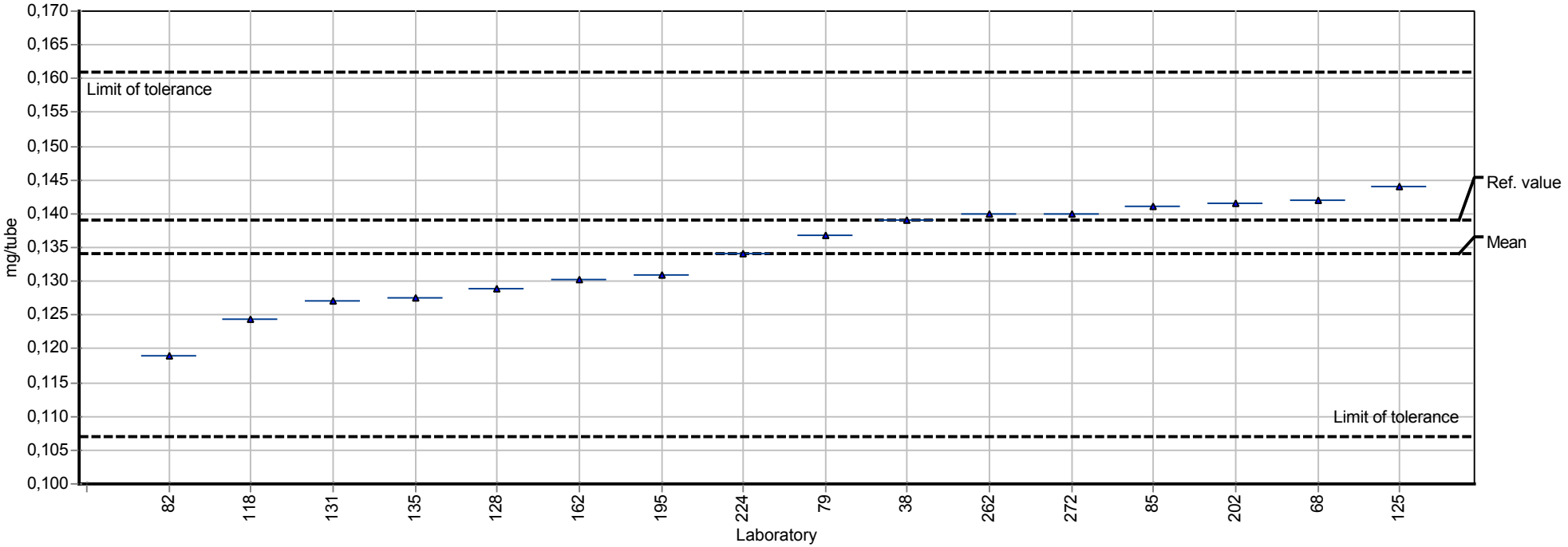
Summary results

Measurand:	**n-Octane**	**Mean:**	**0,388 mg/tube**
Sample:	**sample 2**	**Reproducibility s.d.:**	**0,023 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**6,06%**
No. of laboratories:	**13**	**Tolerance limits:**	**0,310 - 0,465 mg/tube (|Z score| < 2,00)**



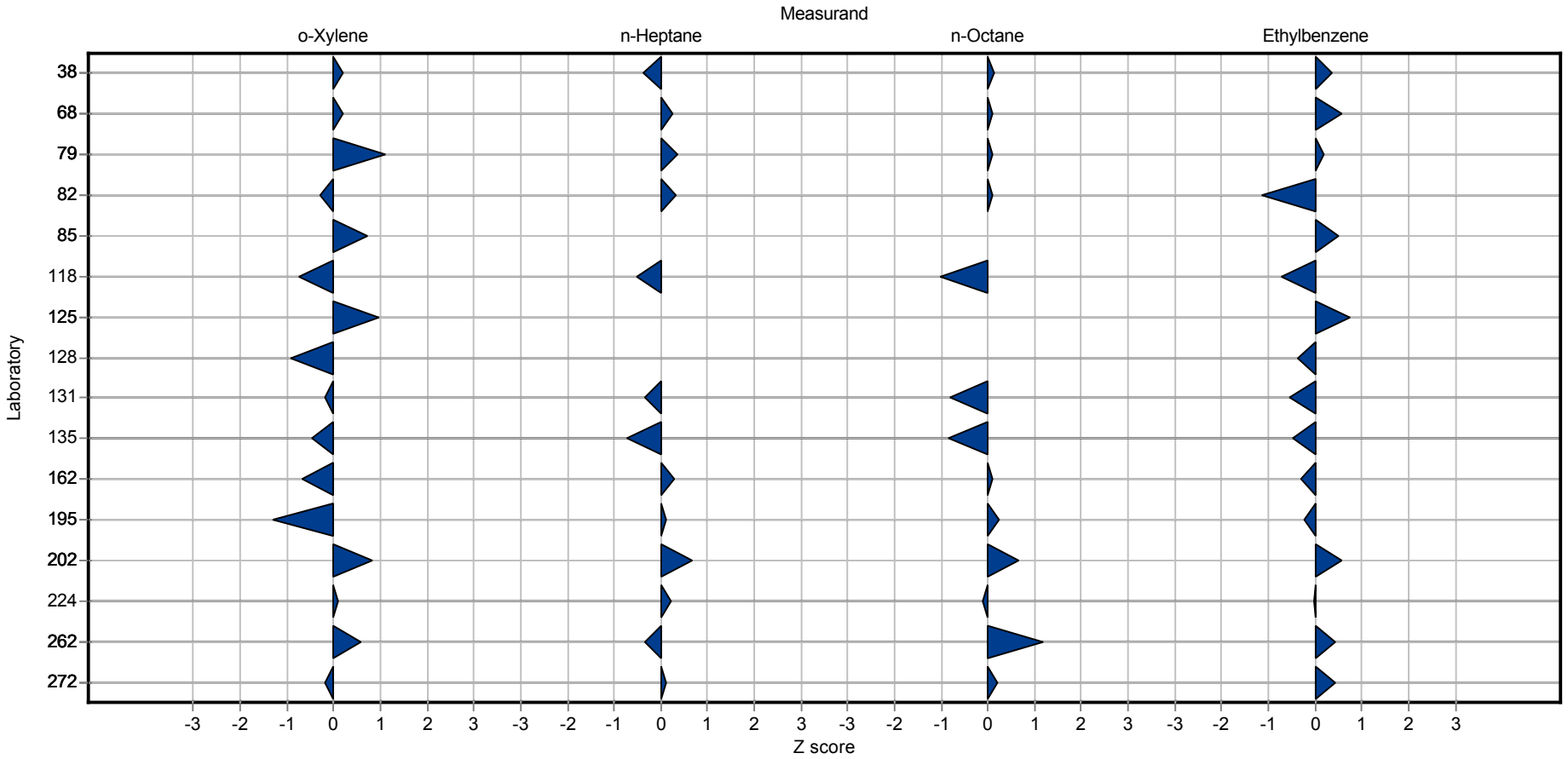
Summary results

Measurand:	**Ethylbenzene**	**Mean:**	**0,134 mg/tube**
Sample:	**sample 2**	**Reproducibility s.d.:**	**0,007 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**5,55%**
No. of laboratories:	**16**	**Tolerance limits:**	**0,107 - 0,161 mg/tube (|Z score| < 2,00)**



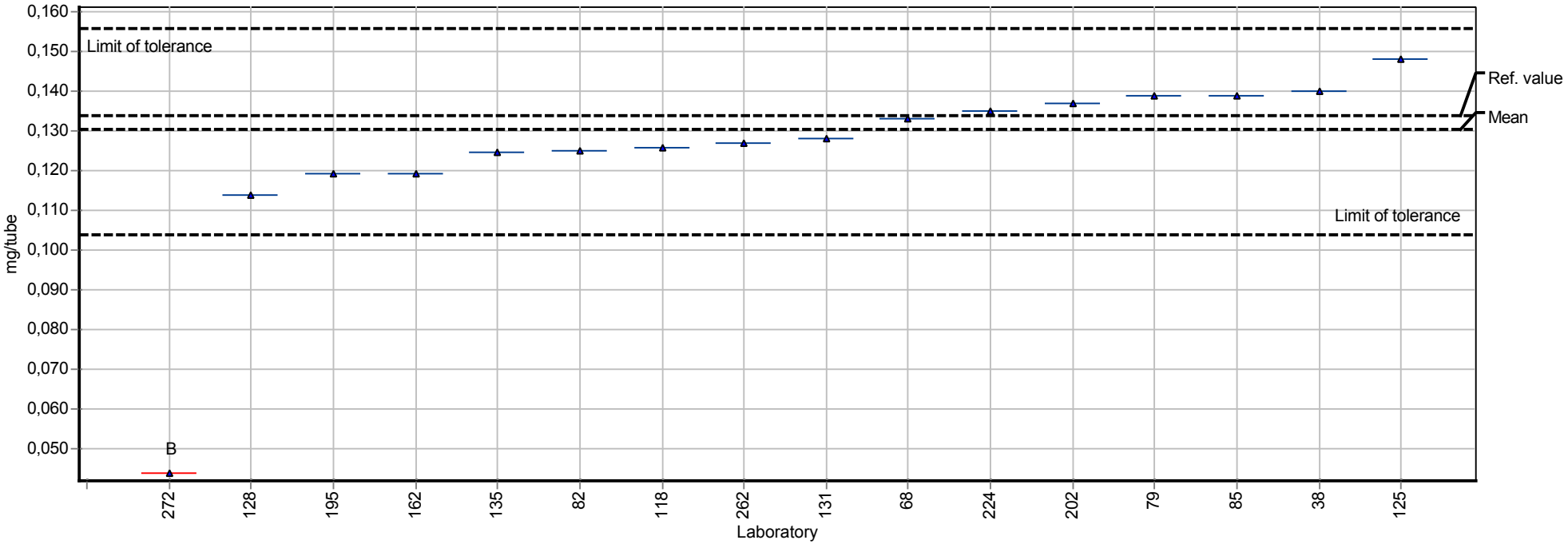
Sample chart of Z scores

Sample: 2



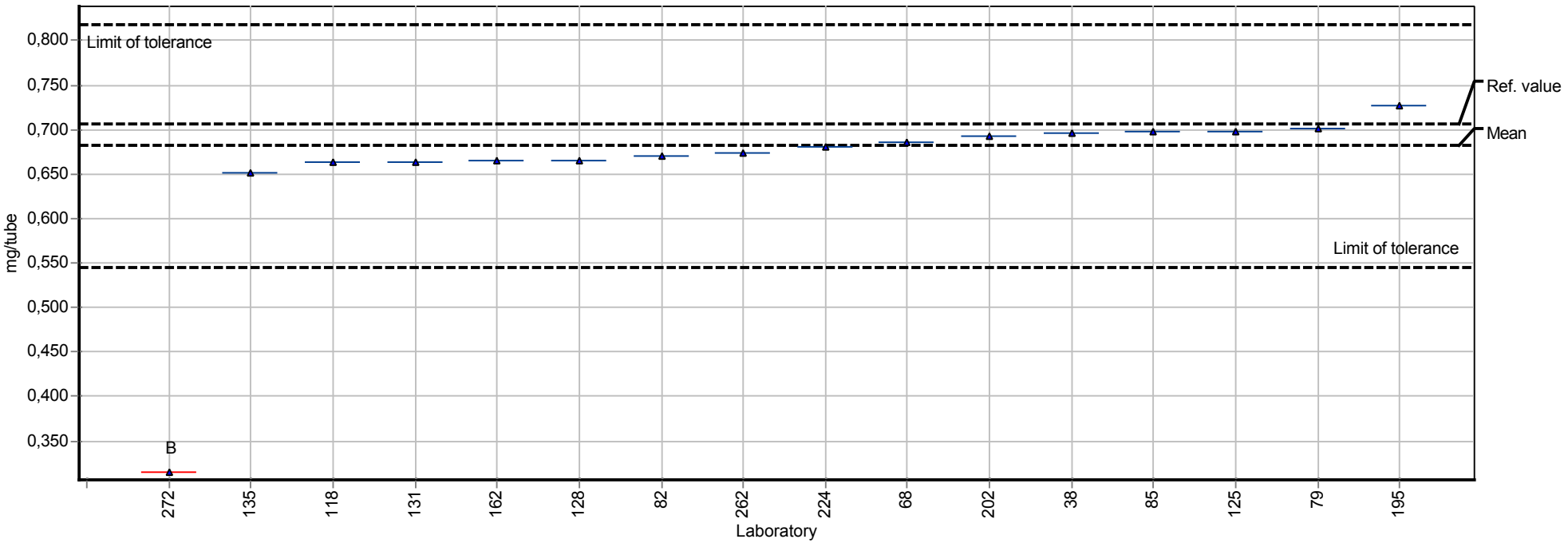
Summary results

Measurand:	**o-Xylene**	**Mean:**	**0,130 mg/tube**
Sample:	**sample 3**	**Reproducibility s.d.:**	**0,009 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**7,18%**
No. of laboratories:	**15**	**Tolerance limits:**	**0,104 - 0,156 mg/tube (|Z score| < 2,00)**



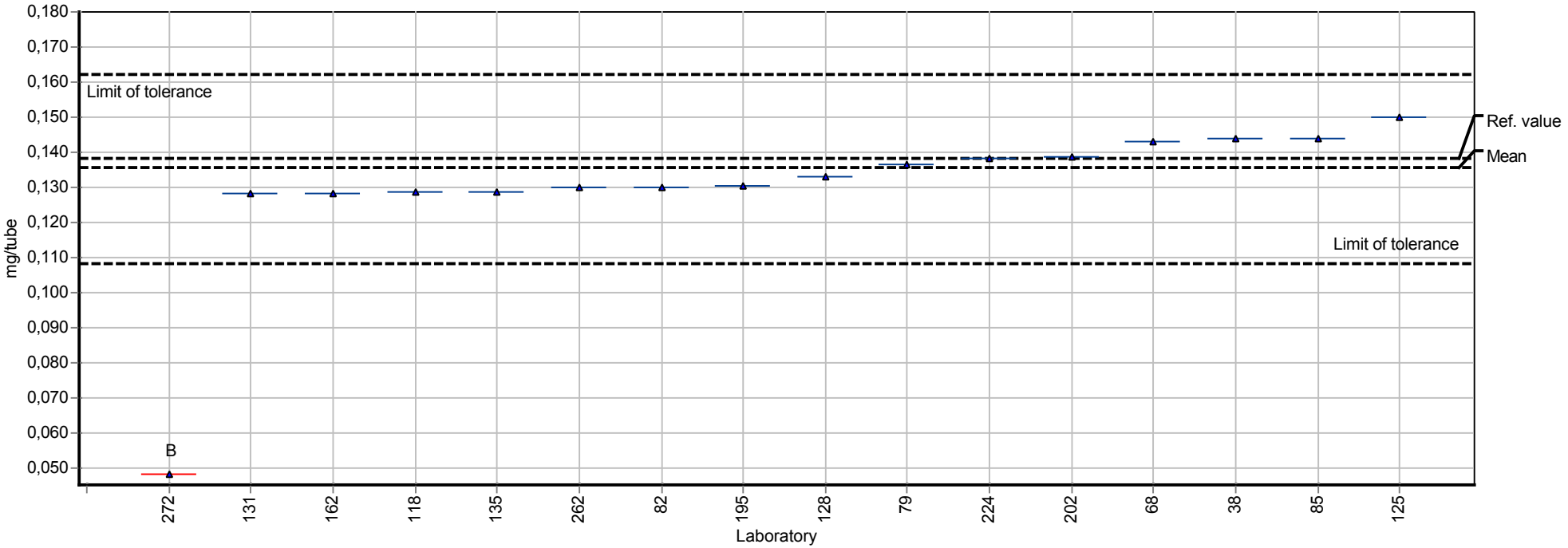
Summary results

Measurand:	**Toluene**	**Mean:**	**0,682 mg/tube**
Sample:	**sample 3**	**Reproducibility s.d.:**	**0,020 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**2,94%**
No. of laboratories:	**15**	**Tolerance limits:**	**0,545 - 0,818 mg/tube (|Z score| < 2,00)**



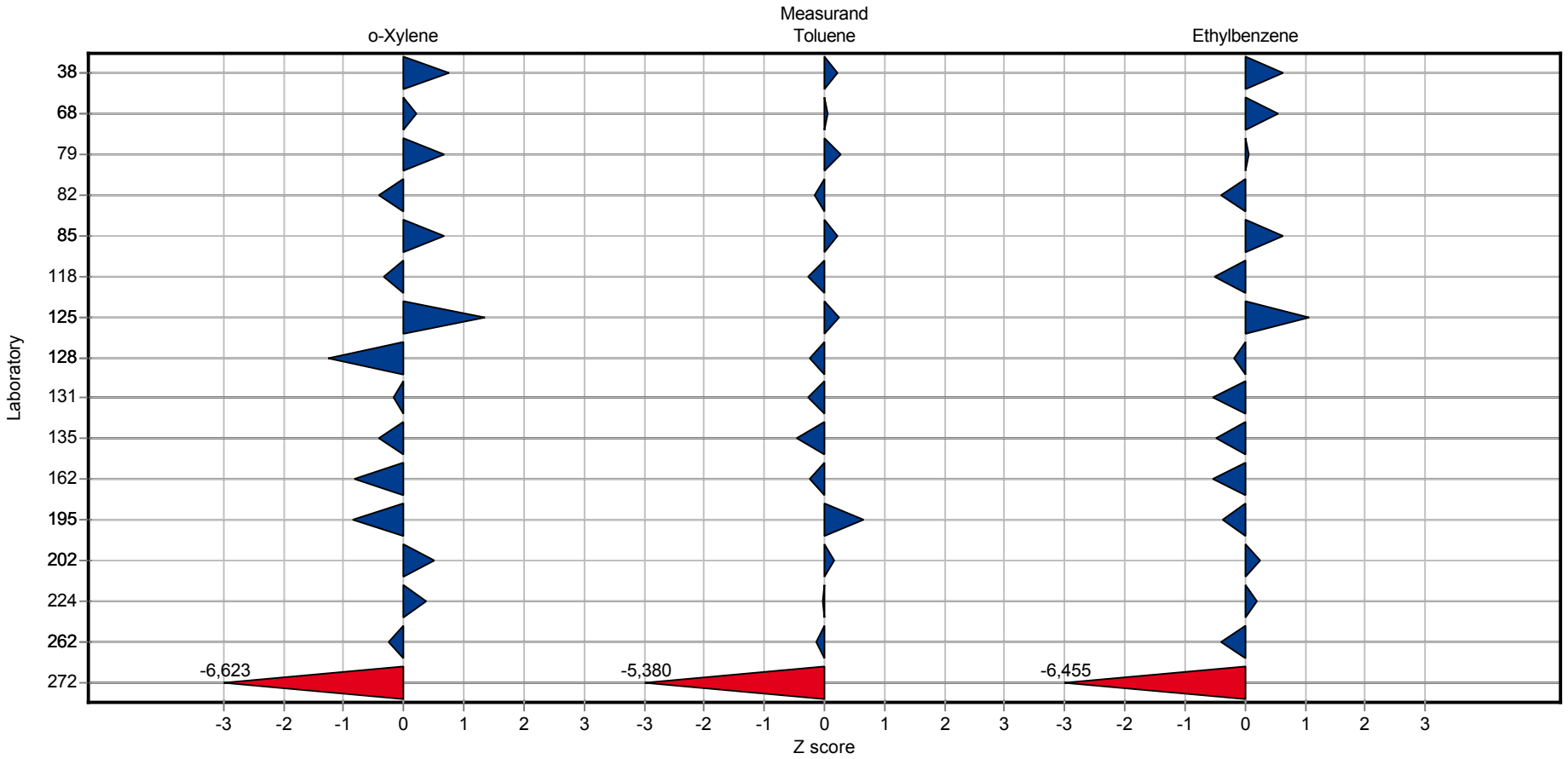
Summary results

Measurand:	**Ethylbenzene**	**Mean:**	**0,135 mg/tube**
Sample:	**sample 3**	**Reproducibility s.d.:**	**0,007 mg/tube**
Method:	**ISO 5725**	**Rel. reproducibility s.d.:**	**5,31%**
No. of laboratories:	**15**	**Tolerance limits:**	**0,108 - 0,162 mg/tube (|Z score| < 2,00)**



Sample chart of Z scores

Sample: 3



Questions and Answers

Participant	kind of tube (NIOSH or TYPE B)	analytical method	solvent	volume	carrier gas
38	Dräger Typ NIOSH	Hausmethode	Schwefelkohlenstoff + 2% Methanol	4 ml	Helium
68	NIOSH	GC/FID	CS2	1 ml	Helium
79	NIOSH	BIA 6265	CS2	0,5 ml	Wasserstoff
82	NIOSH	ja	CS2 / Isopropanol (80/20)	1 ml	Helium
85	NIOSH	Ja	CS2	1ml	Stickstoff
118	NIOSH	in Anlehnung an die VDI 2100 Blatt 2	CS2	2mL	Stickstoff
125	NIOSH	NIOSH Nr. 1022	Schwefelkohlenstoff	1 ml	Helium
128	Niosh	Niosh 1501: 2003	Carbon disulfide	1ml	helium
131	NIOSH	own, based on NIOSH and OSHA methods	carbon disulfide	2ml	helium
135	Niosh	Hausmethode	Schwefelkohlenstoff/Methanol , 100/1	10 ml	Helium
162	NIOSH	Hausmethode	CS2	1 ml	Wasserstoff
195	NIOSH	internal method	CARBON DISULFIDE	1 mL	He
202	NIOSH	NIOSH 1501	carbon sulfide	1mL	helium
262	NIOSH	VDI 3865 Bl.3	CS2	1 ml	Helium
272	NIOSH	DFG 3	Ternäres Gemisch	5 ml	Wasserstoff

Participant	injection	autosampler	kind of injection	analytical column	detector
38	Split	Ja	Flüssiginjektion	Varian VF1-MS 60m x 0,32mm x 1µm	MSD 5975 C
68	split	Ja	Lösung	Vocol von Supelco	FID
79	split	nein	Lösung	CP Sil 5 CB	FID
82	ja	ja	split	Agilent HP-5 30m X 0,32mm X 0,25µm	FID
85	Autosampler	Ja	onColumn	DB5-DBWax	FID
118	on-column	ja	Lösung	CP Sil 5 CB / CP-Wax 57 CB	FID
125	1 µl	Agilent 6890	Split	Varian Factor 4 624 MS, 20 m x 0,15 mm ID x 0,84 µm FD	MSD
128	2 microlitri	yes	split	ZB-Wax (30 m - 0.53 mm - 1.0 um)	FID
131	split 1:10	yes	solvent	Agilent HP-5, HP-InnoWax	GC-FID

Participant	injection	autosampler	kind of injection	analytical column	detector
135	Splitlos	Ja	Lösung	Agilent DB1 und Restek RTX 200	FID
162	Split	Ja	Lösung	CP Sil PONA CB 50 m x 0,21 mm ID x 0,5 µm Film	FID
195	1 uL	atosytem-xl perkin elmer	split	élite-db5	fid
202	split	yes	solution	DB624	FID
262	split 1:10	CTC	flüssig	Varian VF 624 ms 60 m	MS
272	1 µl	ja	splitlos	DB5	FID

Participant	data evaluation	date of analysis
38	Interne Standardisierung	15./16.03.2012
68	interner Standard	20.3.2012
79	interner Standard	13. KW 2012
82	Interner Standard	2012-03-14
85	interner Standard	12.03.2012 & 13.03.2012
118	interner Standard	22.03.2012
125	Agilent Enhanced Chemstation, interner Standard Toluen - d8	23.03.2012
128		12/03/2012
131	external standard	08.03.2012
135	externer Standard	17.03.2012
162	Interner Standard	01.04.2012
195	lims	23/03/2012
202	external standard	20/03/2012
262	Flächen-Integration, MS Workstation	27.03.2012
272	externer Standard	26.03.12