

Proficiency testing for in-house and external measuring stations - results and evaluation

Proficiency testing scheme: Aldehydes

November 2023

Summary of laboratory test results

Sample 1

Laboratory	Acetaldehyde	Z score	Butyraldehyde	Z score	Formaldehyde	Z score	Propionaldehyde	Z score
Unit	mg/m ³		mg/m ³		mg/m ³		mg/m ³	
13	0.233	0.24	0.596	-0.60	0.092	0.38	0.456	-0.66
17	0.220	-0.33	0.730	1.51	0.080	-0.98	0.530	0.85
30	0.231	0.15	0.664	0.47	0.094	0.60	0.488	-0.01
38					0.100	1.28		
42	0.239	0.50	0.687	0.83	0.094	0.60	0.498	0.20
46	0.220	-0.33	0.640	0.09	0.080	-0.98	0.480	-0.17
50	0.194	-1.47	0.499	-2.13 E	0.079	-1.09	0.368	-2.47 E
51	0.225	-0.11	0.685	0.80	0.086	-0.30	0.503	0.30
52	0.235	0.34	0.677	0.68	0.100	1.34	0.434	-1.12
53	0.238	0.46	0.711	1.21	0.085	-0.41	0.128	-7.38 BE
56	0.249	0.94	0.567	-1.06	0.088	-0.07	0.481	-0.15
60	0.236	0.39	0.673	0.62	0.089	0.01	0.499	0.21
62	0.217	-0.46	0.550	-1.33	0.085	-0.41	0.442	-0.95
67	0.261	1.47			0.101	1.39	0.536	0.97
68	0.213	-0.64	0.572	-0.98	0.076	-1.43	0.588	2.04 E
69	0.206	-0.93			0.102	1.48	0.499	0.22
72	0.198	-1.30	0.559	-1.19	0.076	-1.43	0.402	-1.77
82					0.100	1.28		
83					0.091	0.27		
98	0.248	0.90	0.737	1.62	0.094	0.60	0.531	0.88
124	0.220	-0.33	0.660	0.41	0.090	0.15	0.490	0.03
128	0.236	0.37	0.501	-2.10 E	0.090	0.15	0.750	5.35 BE
132	0.173	-2.39 BE			0.090	0.21	0.461	-0.57
135	0.227	-0.02	0.676	0.66	0.086	-0.33	0.510	0.44
141	0.232	0.20			0.095	0.69	0.494	0.11
156					0.076	-1.43		
167	0.233	0.22	0.699	1.02	0.087	-0.19	0.516	0.57
168	0.211	-0.73			0.102	1.51	0.504	0.32
174	0.224	-0.15	0.631	-0.05	0.089	0.04	0.482	-0.13

Laboratory	Acetaldehyde	Z score	Butyraldehyde	Z score	Formaldehyde	Z score	Propionaldehyde	Z score
182	0.230	0.11	0.622	-0.19	0.089	0.04	0.522	0.69
186	0.232	0.20	0.635	0.01	0.086	-0.30	0.534	0.93
192	0.227	-0.02	0.684	0.78	0.088	-0.07	0.496	0.15
199	0.228	0.02	0.636	0.03	0.080	-0.98	0.444	-0.91
207	0.222	-0.24	0.477	-2.48 E	0.088	-0.07	0.601	2.30 E
218	0.226	-0.06	0.666	0.50	0.088	-0.08	0.487	-0.02
228	0.237	0.43	0.601	-0.53	0.089	0.08	0.456	-0.66
238	0.219	-0.37	0.580	-0.85	0.082	-0.75	0.467	-0.44
256	0.233	0.24	0.698	1.01	0.093	0.49	0.484	-0.09
258	0.230	0.11	0.609	-0.40	0.087	-0.19	0.488	-0.01
264	0.220	-0.33	0.480	-2.43 E	0.080	-0.98	0.430	-1.20
267	0.238	0.47	0.794	2.53 E	0.089	0.09	0.498	0.20
292	0.246	0.81	0.709	1.18	0.094	0.60	0.512	0.48
296	0.211	-0.73	0.657	0.36	0.081	-0.86	0.460	-0.58
-	-	--	-	--	-	--	-	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2.00		Z <=2.00		Z <=2.00		Z <=2.00	
No. of laboratories that submitted results	39		34		43		39	
Mean	0.228		0.634		0.089		0.488	
Reproducibility s.d.	0.014		0.077		0.007		0.044	
Rel. reproducibility s.d.	5.96 %		12.07 %		8.03 %		9.10 %	
Reference value	0.223		0.654		0.087		0.487	
Target s.d.	0.023		0.063		0.009		0.049	
Rel. target s.d.	10.00 %		10.00 %		10.00 %		10.00 %	
Lower limit of tolerance	0.182		0.507		0.071		0.391	
Upper limit of tolerance	0.273		0.761		0.106		0.586	
Type B outliers	1						2	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	38		34		43		37	
Explanation of outlier types								
A: Single outlier	Grubbs							
B: Differing laboratory mean	Grubbs							

Laboratory	Acetaldehyde Z score	Butyraldehyde Z score	Formaldehyde Z score	Propionaldehyde Z score
------------	----------------------	-----------------------	----------------------	-------------------------

C: Excessive laboratory s.d.	Cochran			
------------------------------	---------	--	--	--

D: Excluded manually

E: mean outside tolerance limits

F: |Z-Score|>3.50

Summary of laboratory test results

Sample 2

Laboratory	Acetaldehyde	Z score	Formaldehyde	Z score	Propionaldehyde	Z score
Unit	mg/m ³		mg/m ³		mg/m ³	
13	0.078	-0.13	0.180	0.73	0.311	-0.68
17	0.080	0.12	0.140	-1.65	0.370	1.09
30	0.081	0.25	0.174	0.38	0.331	-0.08
38			0.190	1.33		
42	0.083	0.50	0.177	0.55	0.344	0.31
46	0.080	0.12	0.160	-0.46	0.340	0.19
50	0.059	-2.53 E	0.129	-2.31 E	0.240	-2.81 BE
51	0.075	-0.51	0.160	-0.46	0.334	0.01
52	0.088	1.09	0.191	1.37	0.303	-0.91
53	0.078	-0.13	0.157	-0.64	0.085	-7.45 BE
56	0.087	1.01	0.164	-0.22	0.329	-0.14
60	0.080	0.18	0.165	-0.15	0.325	-0.26
62	0.073	-0.76	0.160	-0.46	0.300	-1.01
67	0.095	2.02 E	0.188	1.21	0.367	1.00
68	0.072	-0.89	0.148	-1.17	0.387	1.60
69	0.079	-0.01	0.194	1.55	0.337	0.11
72	0.069	-1.27	0.140	-1.65	0.264	-2.09 E
82			0.240	4.31 BE		
83			0.175	0.44		
98	0.086	0.87	0.178	0.63	0.351	0.52
124	0.080	0.12	0.160	-0.46	0.330	-0.11
128	0.086	0.88	0.171	0.20	0.341	0.22
132	0.058	-2.65 E	0.171	0.21	0.320	-0.42
135	0.079	0.01	0.165	-0.16	0.352	0.55
141	0.082	0.42	0.180	0.73	0.337	0.10
156			0.152	-0.94		
167	0.079	0.00	0.163	-0.30	0.355	0.63
168	0.074	-0.63	0.198	1.81	0.344	0.31
174	0.081	0.25	0.171	0.20	0.336	0.07

Laboratory	Acetaldehyde	Z score	Formaldehyde	Z score	Propionaldehyde	Z score
182	0.081	0.25	0.174	0.38	0.340	0.19
186	0.080	0.12	0.165	-0.16	0.369	1.06
192	0.079	0.00	0.164	-0.22	0.335	0.04
199	0.082	0.38	0.169	0.08	0.315	-0.56
207	0.077	-0.25	0.167	-0.04	0.328	-0.17
218	0.083	0.53	0.174	0.35	0.347	0.41
228	0.082	0.36	0.165	-0.18	0.304	-0.88
238	0.077	-0.25	0.160	-0.46	0.326	-0.23
256	0.081	0.25	0.178	0.61	0.339	0.16
258	0.080	0.12	0.165	-0.16	0.336	0.07
264	0.070	-1.14	0.160	-0.46	0.290	-1.31
267	0.085	0.77	0.171	0.21	0.342	0.25
292	0.088	1.14	0.172	0.26	0.349	0.46
296	0.074	-0.63	0.159	-0.52	0.317	-0.50
-	-	--	-	--	-	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2.00		Z <=2.00		Z <=2.00	
No. of laboratories that submitted results	39		43		39	
Mean	0.079		0.168		0.334	
Reproducibility s.d.	0.007		0.014		0.023	
Rel. reproducibility s.d.	8.89 %		8.42 %		7.01 %	
Reference value	0.078		0.164		0.336	
Target s.d.	0.008		0.017		0.033	
Rel. target s.d.	10.00 %		10.00 %		10.00 %	
Lower limit of tolerance	0.063		0.134		0.267	
Upper limit of tolerance	0.095		0.201		0.400	
Type B outliers			1		2	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	39		42		37	
Explanation of outlier types						
A: Single outlier	Grubbs					
B: Differing laboratory mean	Grubbs					

Laboratory	Acetaldehyde Z score	Formaldehyde Z score	Propionaldehyde Z score
C: Excessive laboratory s.d.	Cochran		
D: Excluded manually			
E: mean outside tolerance limits			
F: Z-Score >3.50			

Summary of laboratory test results

Sample 3

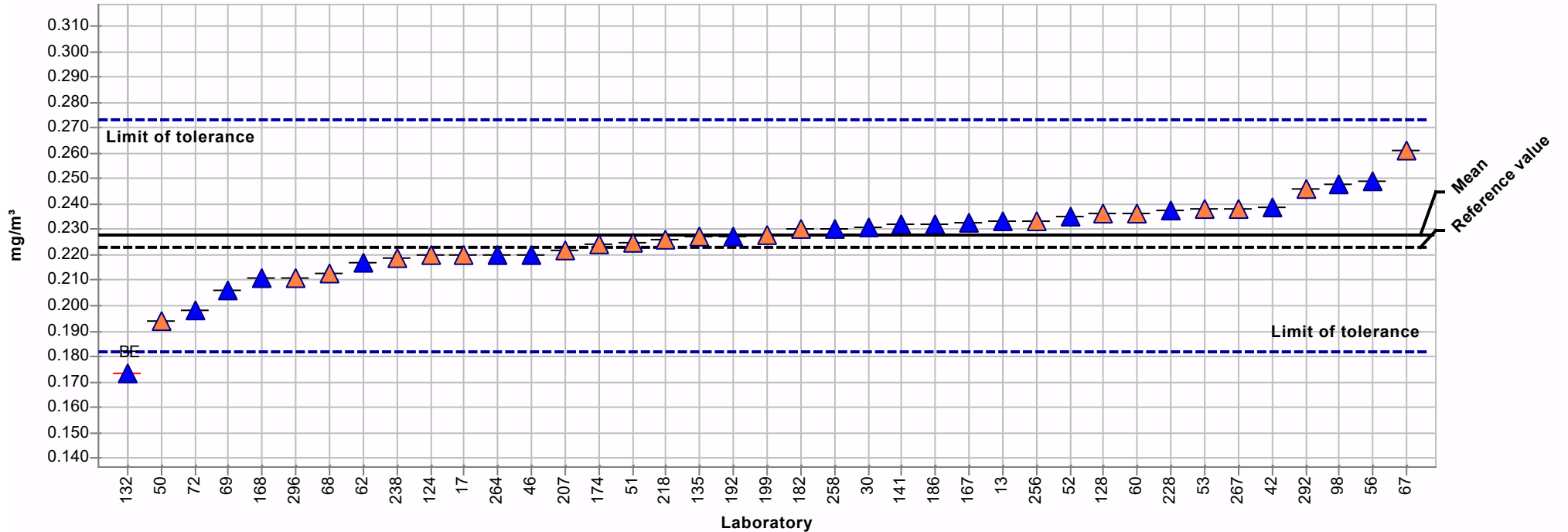
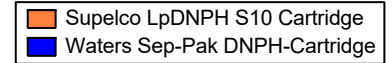
Laboratory	Acetaldehyde	Z score	Butyraldehyde	Z score	Formaldehyde	Z score
Unit	mg/m ³		mg/m ³		mg/m ³	
13	0.137	0.24	0.877	-0.46	0.233	0.65
17	0.130	-0.28	1.080	1.74	0.190	-1.31
30	0.137	0.24	0.952	0.35	0.230	0.52
38					0.250	1.43
42	0.143	0.69	0.996	0.83	0.231	0.56
46	0.120	-1.03	0.860	-0.65	0.190	-1.31
50	0.107	-2.00	0.723	-2.14 E	0.191	-1.27
51	0.131	-0.20	0.940	0.22	0.212	-0.31
52	0.060	-5.49 BE	0.048	-9.48 BE	0.205	-0.62
53	0.139	0.39	1.012	1.00	0.219	0.01
56	0.146	0.92	0.805	-1.25	0.214	-0.21
60	0.136	0.13	0.950	0.33	0.213	-0.27
62	0.125	-0.65	0.785	-1.47	0.210	-0.40
67	0.155	1.59			0.245	1.20
68	0.122	-0.88	0.818	-1.11	0.193	-1.17
69	0.124	-0.74			0.260	1.88
72	0.119	-1.10	0.804	-1.26	0.193	-1.17
82					0.190	-1.31
83					0.232	0.61
98	0.145	0.88	1.067	1.60	0.236	0.80
124	0.130	-0.28	0.950	0.33	0.210	-0.40
128	0.138	0.32	1.063	1.56	0.223	0.20
132	0.102	-2.41 BE			0.224	0.26
135	0.134	0.02	0.972	0.57	0.215	-0.17
141	0.139	0.39			0.236	0.79
156					0.208	-0.49
167	0.136	0.18	0.999	0.86	0.218	-0.01
168	0.128	-0.43			0.256	1.71
174	0.131	-0.20	0.913	-0.07	0.220	0.06

Laboratory	Acetaldehyde	Z score	Butyraldehyde	Z score	Formaldehyde	Z score
182	0.139	0.39	0.910	-0.11	0.227	0.38
186	0.137	0.24	0.985	0.71	0.216	-0.12
192	0.132	-0.13	0.960	0.44	0.214	-0.21
199	0.136	0.17	0.895	-0.27	0.213	-0.26
207	0.132	-0.13	0.858	-0.67	0.220	0.06
218	0.138	0.33	0.992	0.78	0.226	0.35
228	0.135	0.13	0.830	-0.98	0.219	0.00
238	0.131	-0.20	0.848	-0.78	0.211	-0.35
256	0.140	0.47	1.066	1.59	0.235	0.75
258	0.135	0.09	0.880	-0.43	0.214	-0.21
264	0.130	-0.28	0.680	-2.61 E	0.210	-0.40
267	0.141	0.53	0.938	0.20	0.224	0.26
292	0.147	0.99	1.020	1.09	0.232	0.61
296	0.123	-0.80	0.924	0.05	0.195	-1.08
-	-	--	-	--	-	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2.00		Z <=2.00		Z <=2.00	
No. of laboratories that submitted results	39		34		43	
Mean	0.134		0.920		0.219	
Reproducibility s.d.	0.009		0.099		0.017	
Rel. reproducibility s.d.	6.73 %		10.76 %		7.91 %	
Reference value	0.132		0.936		0.210	
Target s.d.	0.013		0.092		0.022	
Rel. target s.d.	10.00 %		10.00 %		10.00 %	
Lower limit of tolerance	0.107		0.736		0.175	
Upper limit of tolerance	0.160		1.104		0.262	
Type B outliers	2		1			
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	37		33		43	
Explanation of outlier types						
A: Single outlier	Grubbs					
B: Differing laboratory mean	Grubbs					

Laboratory	Acetaldehyde Z score	Butyraldehyde Z score	Formaldehyde Z score
C: Excessive laboratory s.d.	Cochran		
D: Excluded manually			
E: mean outside tolerance limits			
F: Z-Score >3.50			

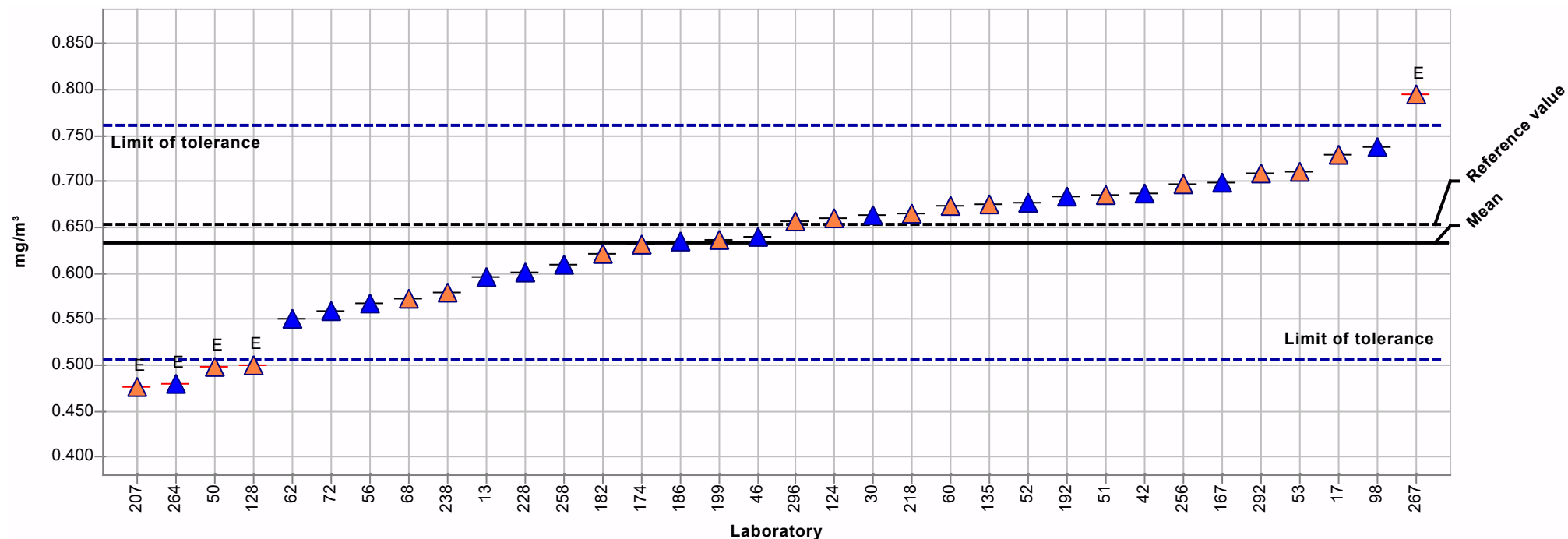
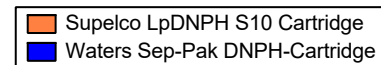
Summary results

Sample:	1	Mean:	0.228 mg/m ³
Measurand:	Acetaldehyde	Reproducibility s.d.:	0.014 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	5.96%
Rel. target s.d.:	10.00%	Reference value:	0.223 mg/m ³
Number of laboratories in calculation:	39	Range of tolerance:	0.182 - 0.273 mg/m ³ (Z-Score <= 2.00)



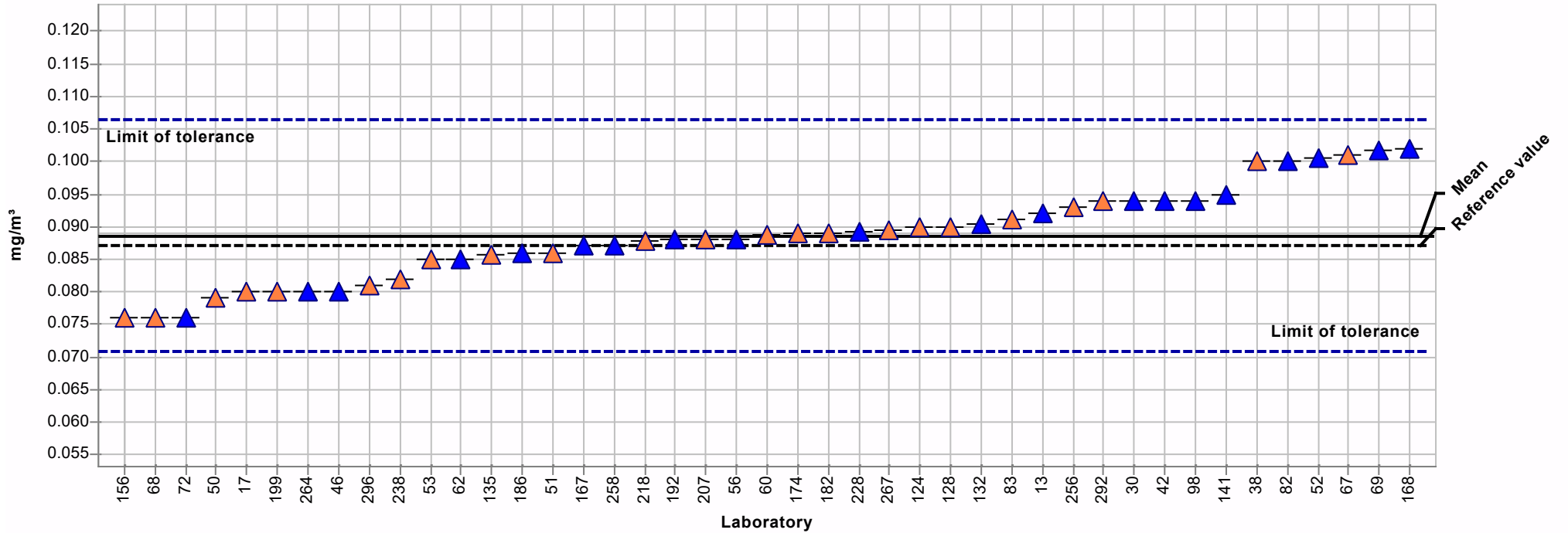
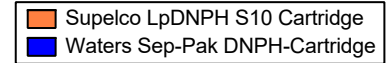
Summary results

Sample:	1	Mean:	0.634 mg/m ³
Measurand:	Butyraldehyde	Reproducibility s.d.:	0.077 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	12.07%
Rel. target s.d.:	10.00%	Reference value:	0.654 mg/m ³
Number of laboratories in calculation:	34	Range of tolerance:	0.507 - 0.761 mg/m ³ (Z-Score <= 2.00)



Summary results

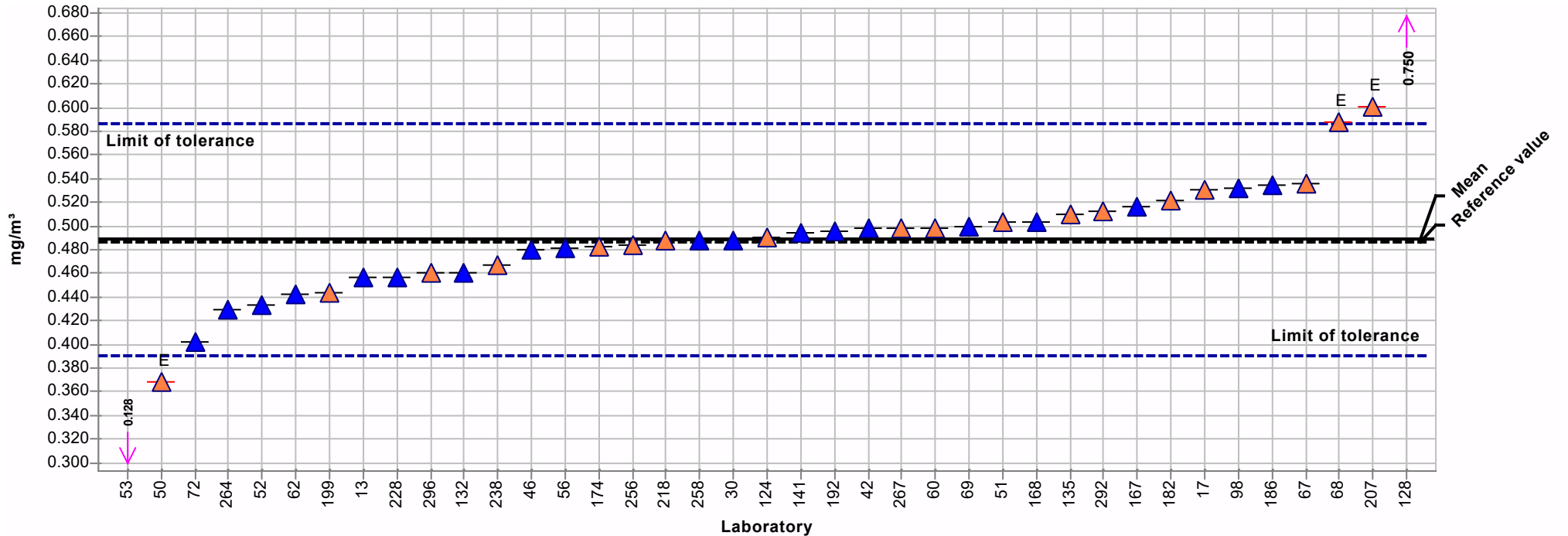
Sample:	1	Mean:	0.089 mg/m ³
Measurand:	Formaldehyde	Reproducibility s.d.:	0.007 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	8.03%
Rel. target s.d.:	10.00%	Reference value:	0.087 mg/m ³
Number of laboratories in calculation:	43	Range of tolerance:	0.071 - 0.106 mg/m ³ (Z-Score <= 2.00)



Summary results

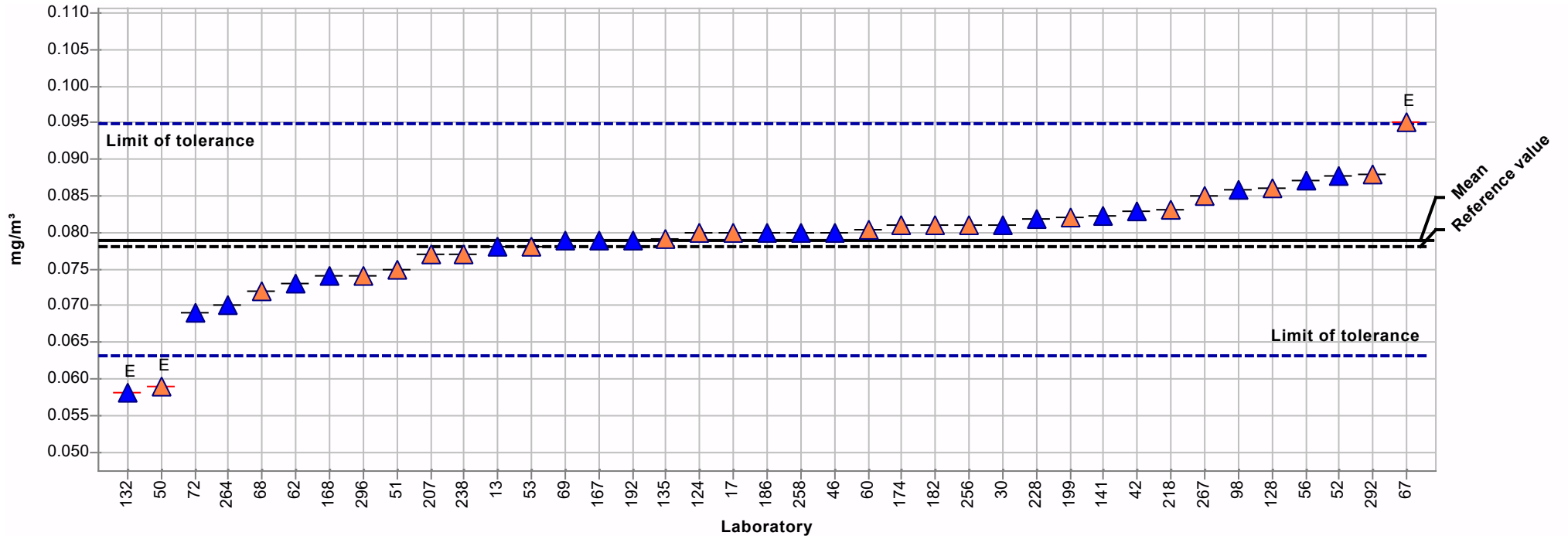
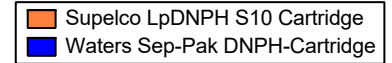
Sample:	1	Mean:	0.488 mg/m ³
Measurand:	Propionaldehyde	Reproducibility s.d.:	0.044 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	9.10%
Rel. target s.d.:	10.00%	Reference value:	0.487 mg/m ³
Number of laboratories in calculation:	39	Range of tolerance:	0.391 - 0.586 mg/m ³ (Z-Score <= 2.00)

▲ Supelco LpDNPH S10 Cartridge
▲ Waters Sep-Pak DNPH-Cartridge



Summary results

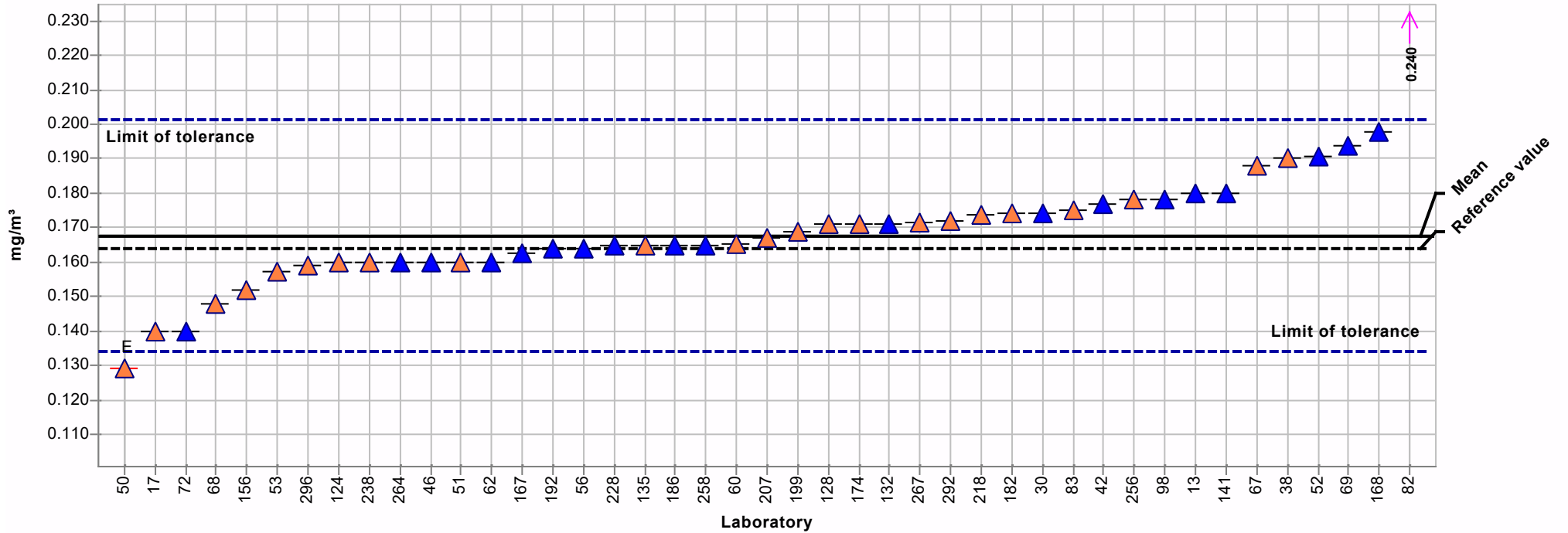
Sample:	2	Mean:	0.079 mg/m ³
Measurand:	Acetaldehyde	Reproducibility s.d.:	0.007 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	8.89%
Rel. target s.d.:	10.00%	Reference value:	0.078 mg/m ³
Number of laboratories in calculation:	39	Range of tolerance:	0.063 - 0.095 mg/m ³ (Z-Score <= 2.00)



Summary results

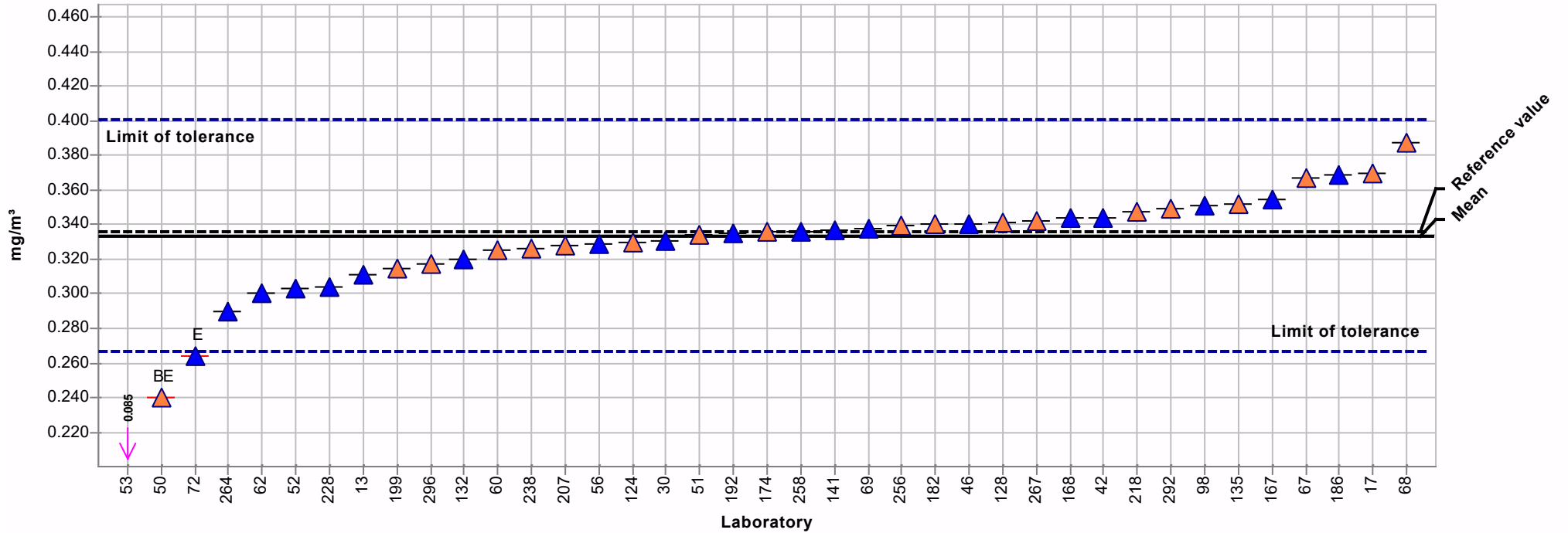
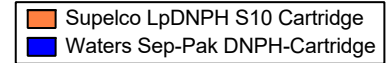
Sample:	2	Mean:	0.168 mg/m ³
Measurand:	Formaldehyde	Reproducibility s.d.:	0.014 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	8.42%
Rel. target s.d.:	10.00%	Reference value:	0.164 mg/m ³
Number of laboratories in calculation:	43	Range of tolerance:	0.134 - 0.201 mg/m ³ (Z-Score <= 2.00)

▲ Supelco LpDNPH S10 Cartridge
▲ Waters Sep-Pak DNPH-Cartridge



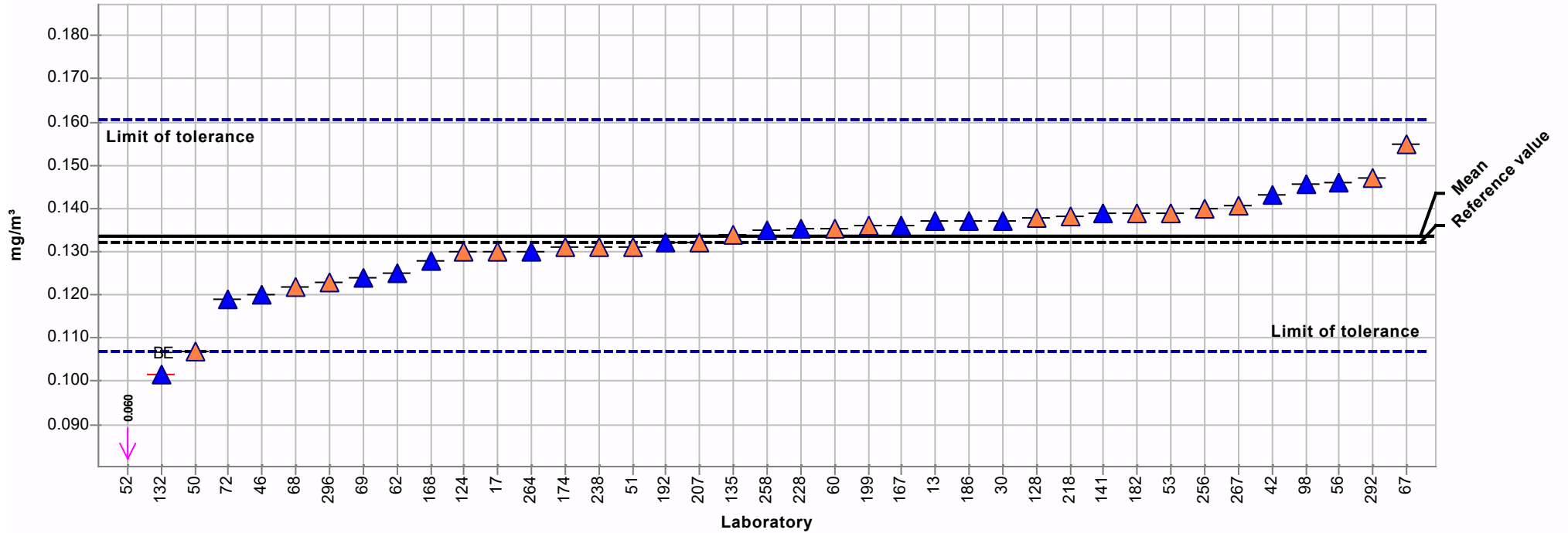
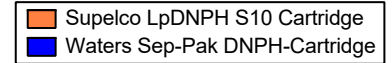
Summary results

Sample:	2	Mean:	0.334 mg/m ³
Measurand:	Propionaldehyde	Reproducibility s.d.:	0.023 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	7.01%
Rel. target s.d.:	10.00%	Reference value:	0.336 mg/m ³
Number of laboratories in calculation:	39	Range of tolerance:	0.267 - 0.400 mg/m ³ (Z-Score <= 2.00)



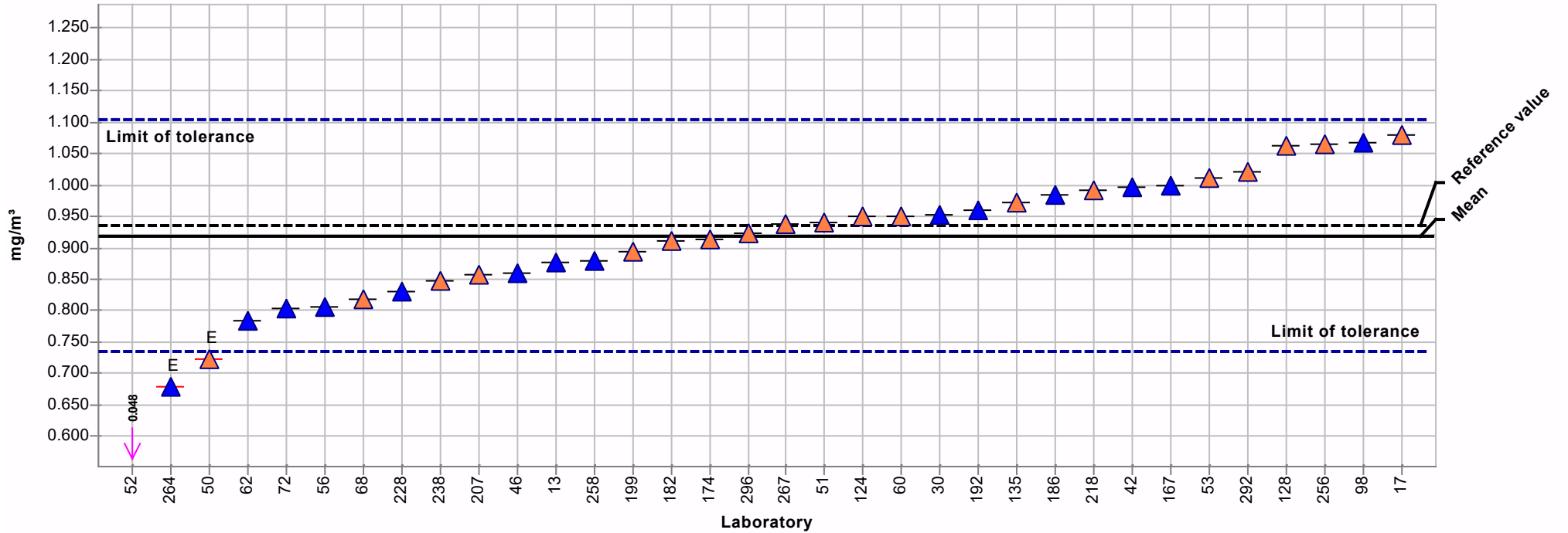
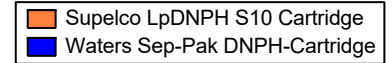
Summary results

Sample:	3	Mean:	0.134 mg/m ³
Measurand:	Acetaldehyde	Reproducibility s.d.:	0.009 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	6.73%
Rel. target s.d.:	10.00%	Reference value:	0.132 mg/m ³
Number of laboratories in calculation:	39	Range of tolerance:	0.107 - 0.160 mg/m ³ (Z-Score <= 2.00)



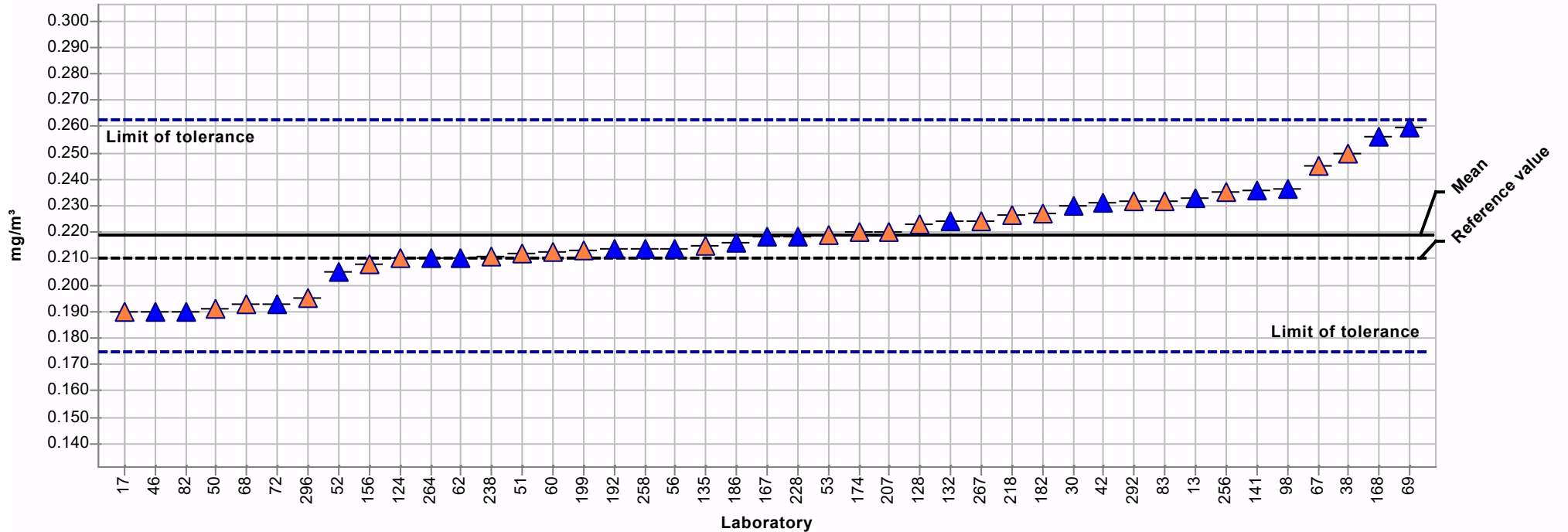
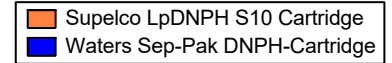
Summary results

Sample:	3	Mean:	0.920 mg/m ³
Measurand:	Butyraldehyde	Reproducibility s.d.:	0.099 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	10.76%
Rel. target s.d.:	10.00%	Reference value:	0.936 mg/m ³
Number of laboratories in calculation:	34	Range of tolerance:	0.736 - 1.104 mg/m ³ (Z-Score <= 2.00)



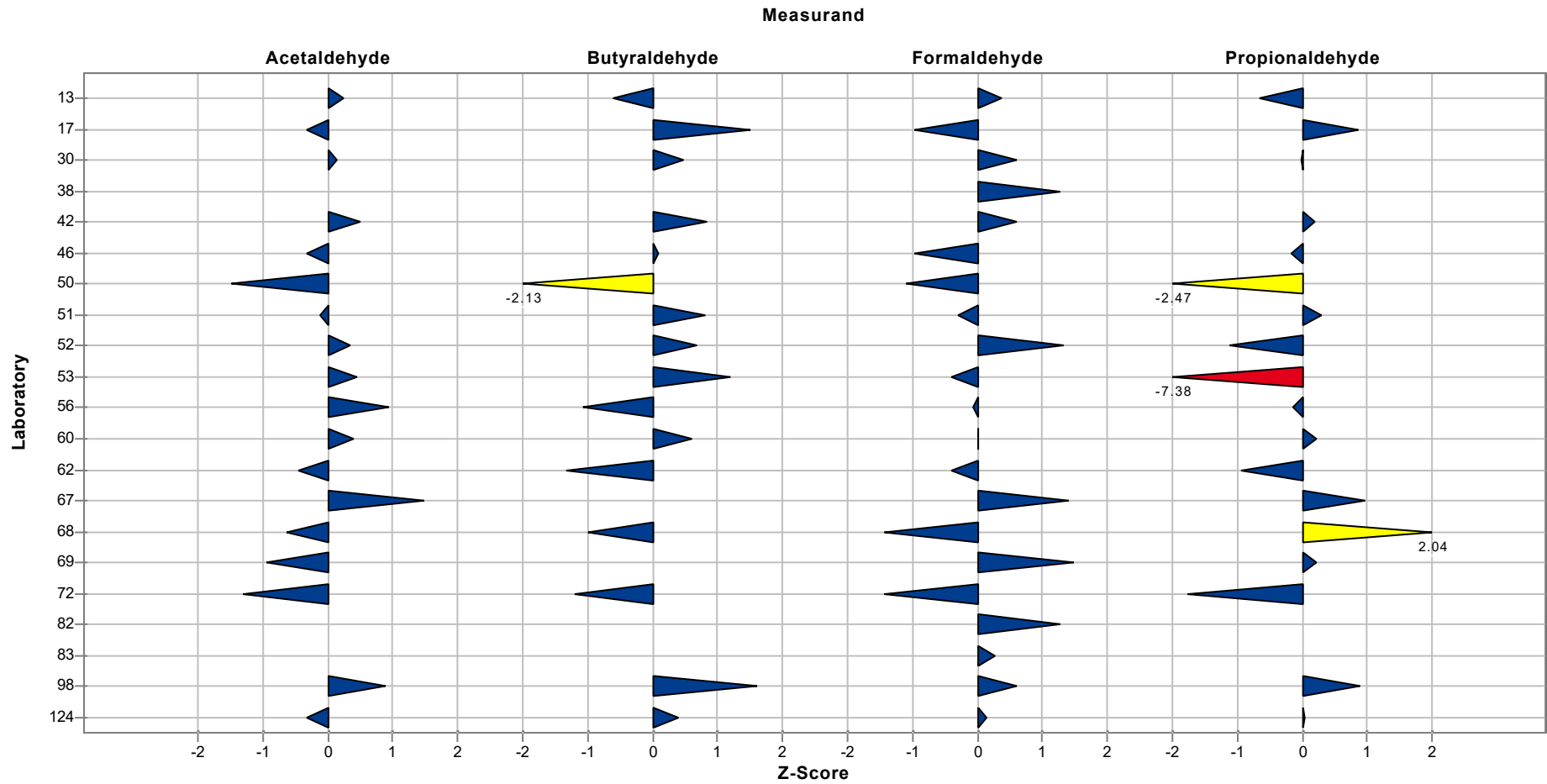
Summary results

Sample:	3	Mean:	0.219 mg/m ³
Measurand:	Formaldehyde	Reproducibility s.d.:	0.017 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	7.91%
Rel. target s.d.:	10.00%	Reference value:	0.210 mg/m ³
Number of laboratories in calculation:	43	Range of tolerance:	0.175 - 0.262 mg/m ³ (Z-Score <= 2.00)



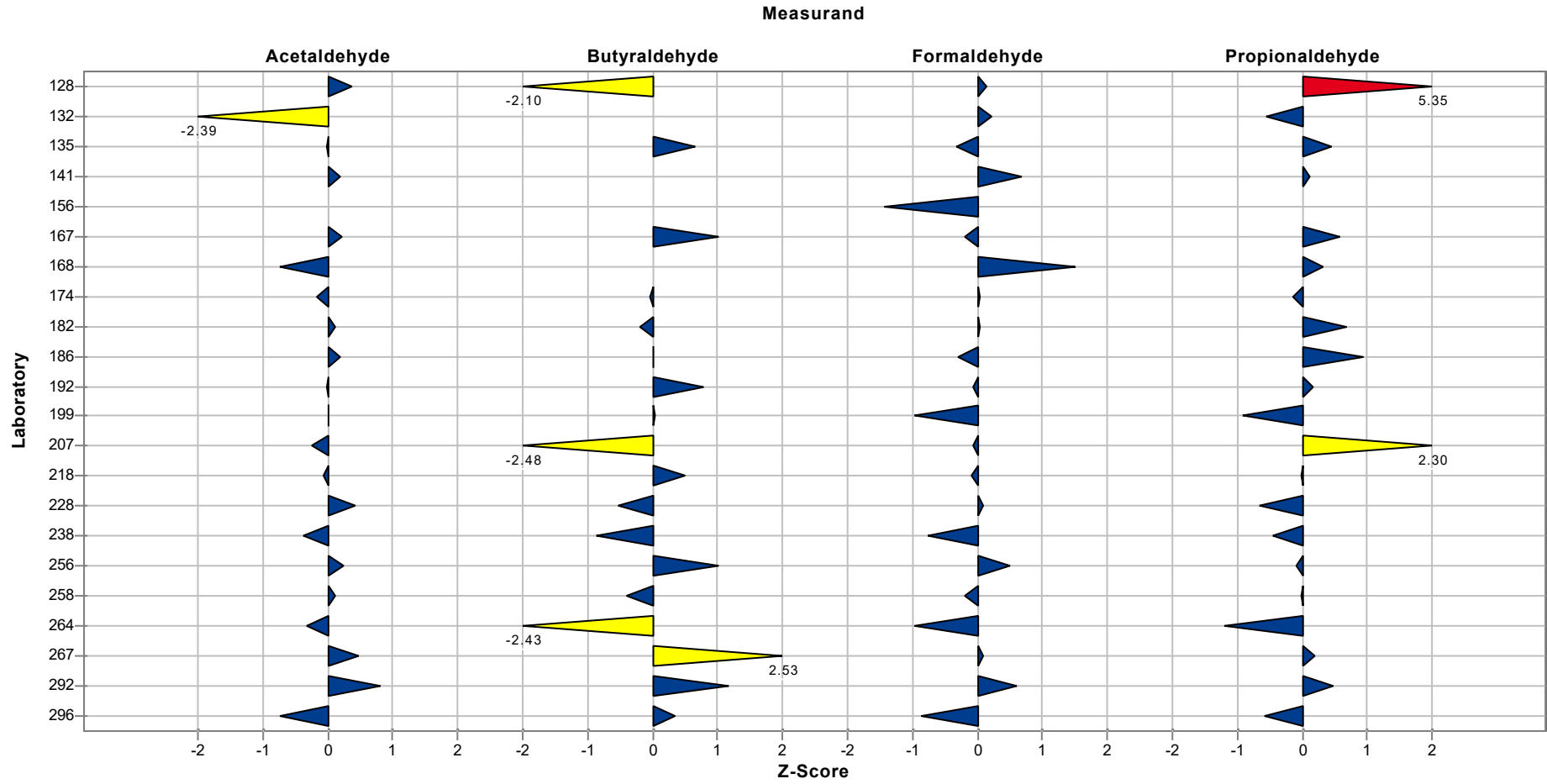
Sample chart of Z-Scores

Sample: 1



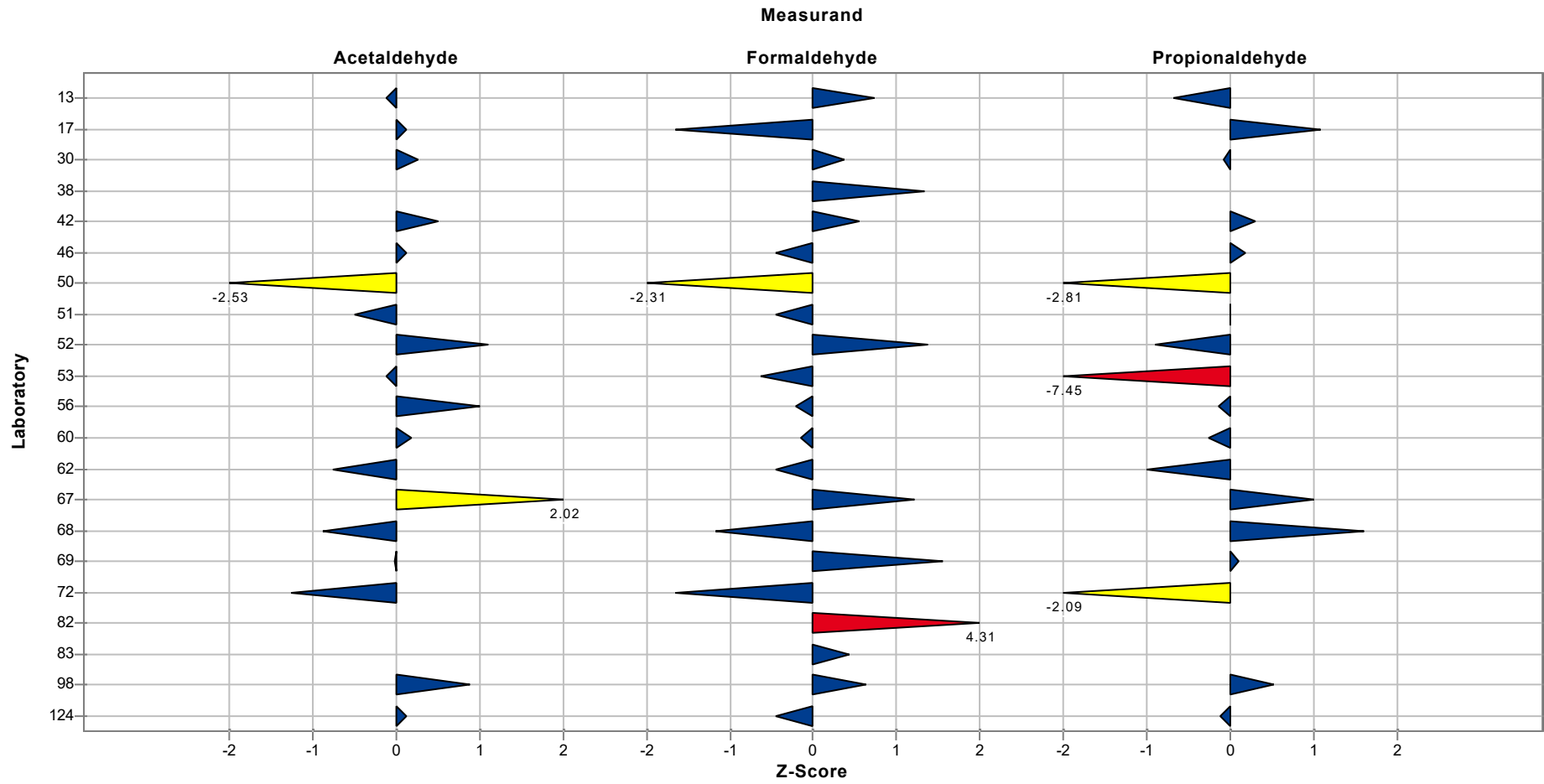
Sample chart of Z-Scores

Sample: 1



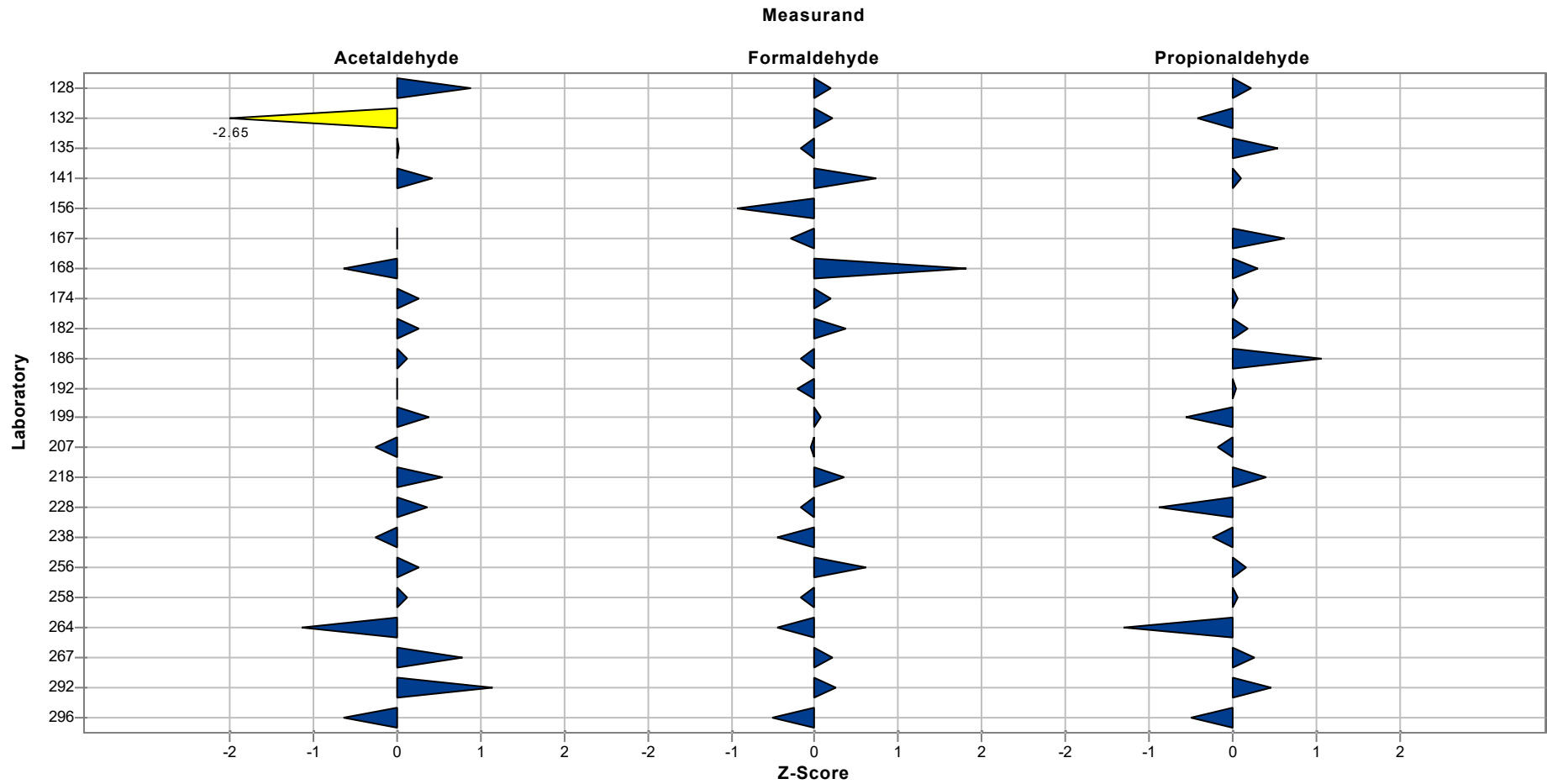
Sample chart of Z-Scores

Sample: 2



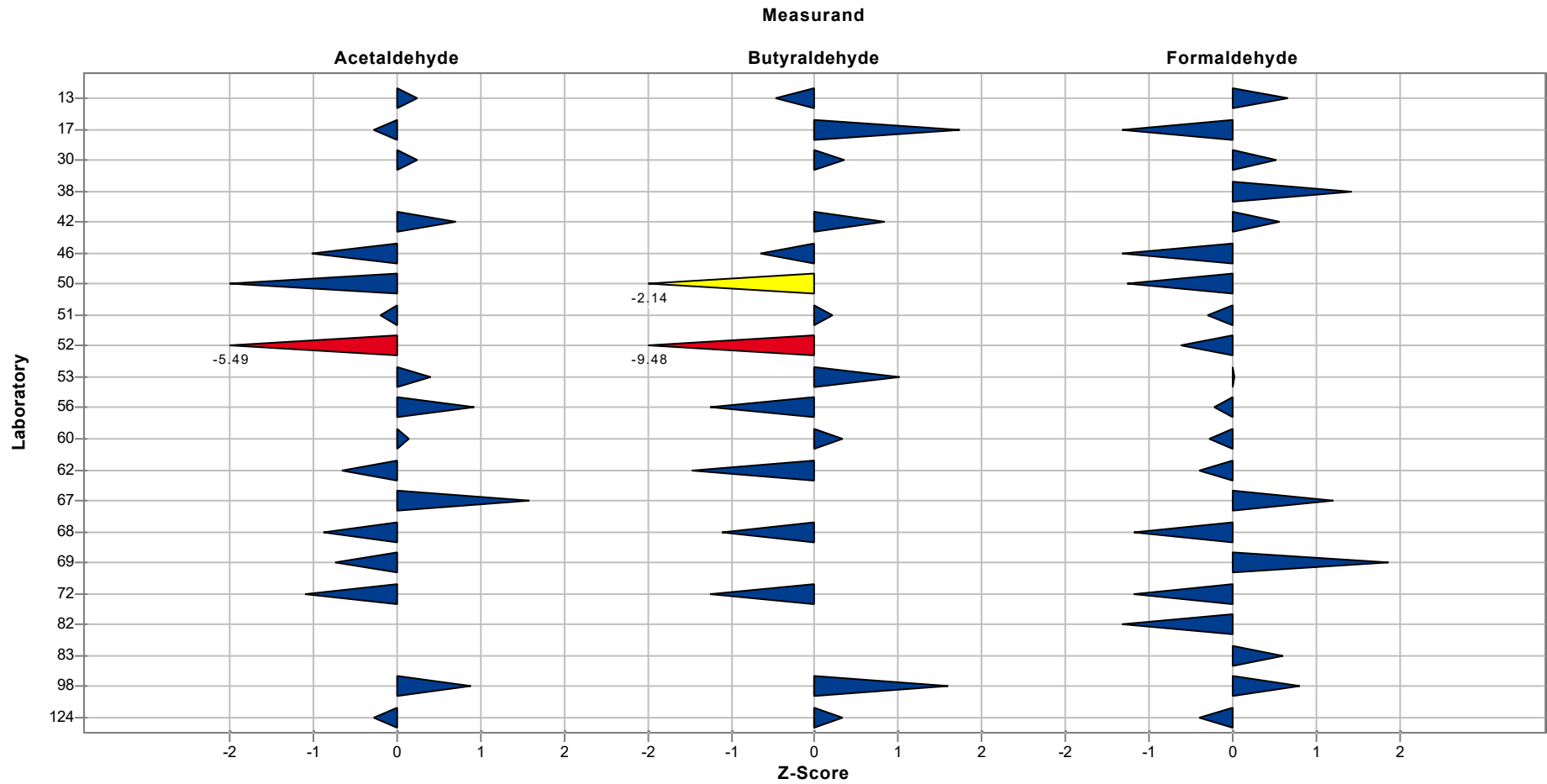
Sample chart of Z-Scores

Sample: 2



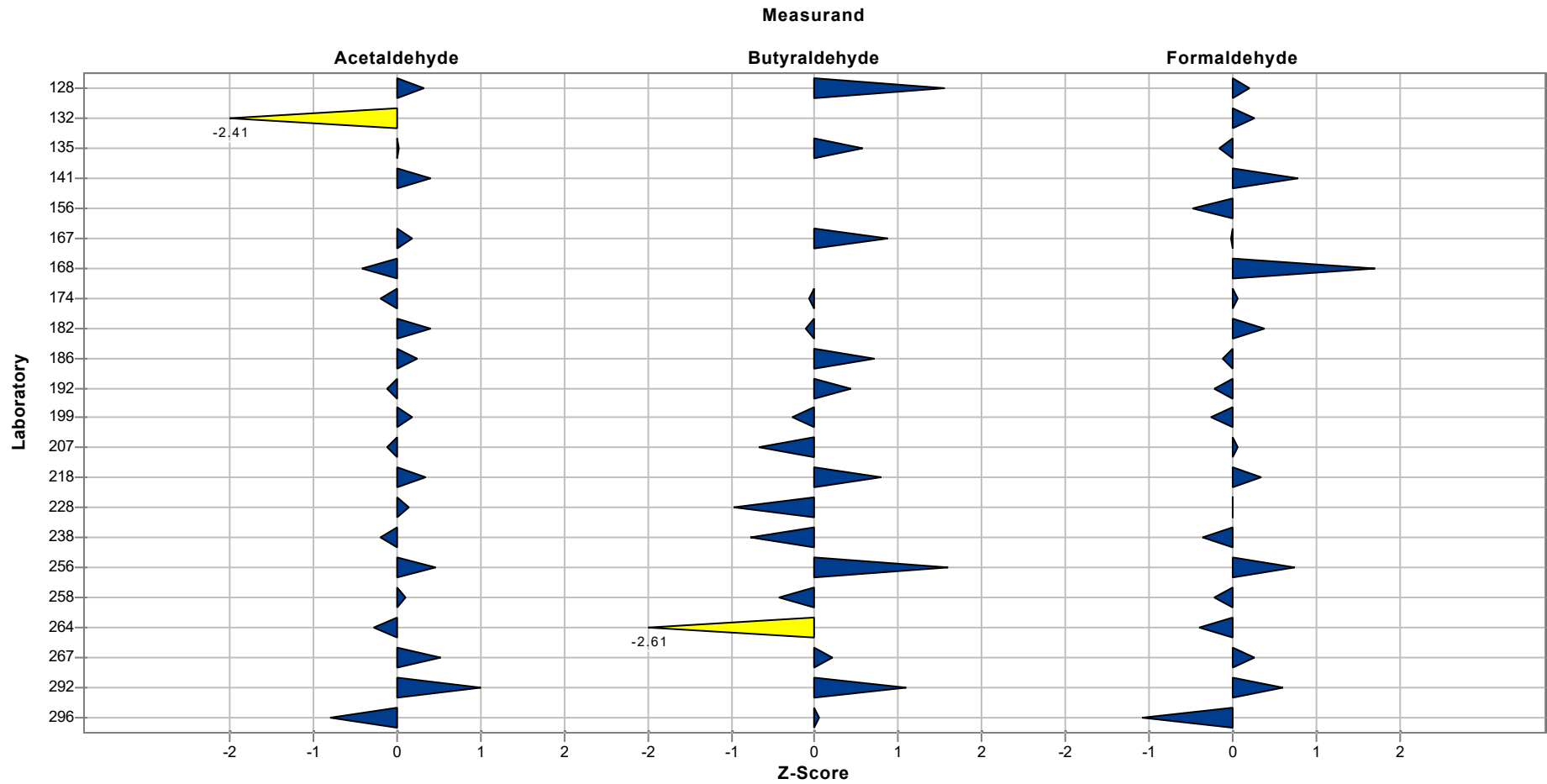
Sample chart of Z-Scores

Sample: 3



Sample chart of Z-Scores

Sample: 3



Questions and Answers

Participant	Analytical method	Date start sample desorption
13	AIR-ANAL-51 Aldehyden	29/11/2023
17	EN ISO 16000-3	9.11.2023
30	iso 16000-3 / en 16516	12/12/2023 (elution)
38	DIN ISO 16000-3	14.11.2023
42	IFA Arbeitsmappe 6045	09.11.23
46	DIN ISO 1600-3	15.11.2023
50	DIN ISO 16000-3	15.11.2023
51	Internal method derived from DIN ISO 16000-3:2011	23/11/2023
52	Hausverfahren	15.11.2023
53	in Anlehnung an Compendium Method TO-11A	21.11.2023
56	HPLC	15/11/23
60	HPLC-DAD	10/11/2023
62	HPLC-UV	14/11/23
67	NIOSH 2016:2016 and NIOSH 2018:2003	I started on Novembre 16, 2023
68	HPLC Aldehyde	13.11.2023
69	HPLC	15/11/23
72	LC1	10.11.2023
82	IFA 6045	22.11.2023
83		
98	analog IFA 6045 XI/09	14.11.23
124	HPLC	12/12/2023
128	ISO 16000-3	11/21/23
132	Intertek Internal method	11/21/2023
135	DIN ISO 16000-3	13.11.2023
141	HPLC-DAD	13-11-2023
156	HPLC-UV	20.11.2023
167	ISO 16000-3	06.Dec.2023
168		
174	HPLC/UV	04/12/2023
182	DIN ISO 16000-3:2011	09.11.2023
186	UPLC-PDA	23/11/23

Aldehydes 2023

Participant	Analytical method	Date start sample desorption
192	ISO 16000-3	November 22, 2023
199	DIN ISO 16000-3	14.11.2023
207	ISO 16000-3	06.12.2023
218	DIN ISO 16000-3:2011	14.11.2023
228	ISO 16000-3	11.12.2023
238	HPLC UV	9/11/23
256	in Anlehnung an EPA TO-11A	15.11.2023
258	ISO 1600-3	November 9, 2023
264	HPLC/UV	17/11/2023
267	ISO 16000-3	15/11/2023
292		
296	NIOSH 2016 2016	15/12/2023

Participant	Storage time after desorption
13	Analysis took place immediately after desorption. Parts of the samples were stored in the refrigerator after desorption in case something went wrong during the analysis.
17	ja, Kühlschrank, 5 Tage
30	33 days refrigerator
38	die Proben wurden vom 14.11.23 bis 20.11.23 im Kühlschrank 4°C gelagert
42	24h, Kühlschrank (8°C)
46	Nein, wurden sofort analysiert
50	keine Lagerung
51	45 minutes - room temperature
52	ja im Gefrierschrank bis zur Analytik
53	nein
56	no storage analysed just after desorption
60	1h00
62	5 days at 4]
67	I desorbed on November 16, 2023 and i stored at 4 °C
68	Die Proben wurden 3 Tage im Kühlschrank gelagert
69	0 days
72	nein
82	Es fand keine Lagerung statt. Die Probe wurde nach der Aufarbeitung direkt analysiert.
98	Proben werden nicht eingefroren, sondern im Kühlschrank aufbewahrt.

Aldehydes 2023

Participant	Storage time after desorption
124	the samples were analyzed within 1 h of desorption
128	2 weeks – Room temp & refrigerator - placed in a refrigerator upon receipt
132	< 8 hours
135	nein
141	less than 24 hours
156	14 days
167	30 min at room temp
174	No storage after desorption
182	nein
186	No storage, injection on the day
192	No storage after desorption
199	nein
218	Kühlschrank (1-5 °C). 16 Tage.
228	restliches Eluat Kühlschrank
238	Immediately
256	direkte Analyse, danach Aufbewahrung im Kühlschrank
258	2 hours, storage in autosampler at room temperature
267	Extracts analyzed directly after desorption (the same day)
296	5 days

Participant	Date of analysis	Desorption solution
13	29/11/2023	Acetonitrile
17	14.11.2023	Acetonitril
30	12/12/2023	acetonitrile
38	20.11.2023	Acetonitril
42	10.11.23	DNPH-Lösung
46	15.11.2023	ACN
50	15.11.2023	Acetonitril
51	23-24/11/2023	CH3CN
52	15.11.2023 - 17.11.2023	DNPH-Lösung, Acetonitril
53	21.11.2023	Acetonitril
56	15/11/2023	acetonitril
60	10/11/2023	100% Acetonitrile

Aldehydes 2023

Participant	Date of analysis	Desorption solution
62	15/11/23	acetonitrile
67	I desorbed and analyzed the samples on November 16, 2023	A solution of acetonitrile was used
68	16.11.2023	Acetonitril
69	15/11/23	Acetonitrile
72	10.11.2023	Acetonitril
82	22.11.2023	Acetonitril
98	27.11.23	Acetonitril
124	12/12/2023	MeCN
128	11/22/23	Acetonitrile
132	11/21/2023 -11/22/2023	Acetonitrile
135	13.11.2023	Acetonitril
141	13-11-2023	Acetonitril HPLC grade
156	21.11.2023	ACN
167	06.Dec.2023	Acetonitrile
174	04/12/2023	Acetonitrile
182	09.11.2023	Acetonitril
186	23/11/23	Acétonitrile
192	November 22, 2023	Acetonitrile
199	14.11.2023	Acetonitril
207	06.12.2023	ACN/H2O 60/40 + 5mmol(NH4)HCO3
218	30.11.2023	Acetonitril
228	13.12.2023	Acetonitril
238	9/11/23	acetonitrile
256	15.11.2023	ACN
258	November 9, 2023	Acetonitrile
264	17/11/2023	Acetonitrile
267	15/11/2023	Acetonitrile
296	19/12/2023	ACN:H2O 8:2

Participant	Desorption volume
13	5 ml
17	5 mL
30	5

Aldehydes 2023

Participant	Desorptionvolumen
38	3 ml
42	10
46	5 ml
50	5 ml
51	5 mL
52	5 ml
53	5mL
56	5
60	3
62	5ml
67	10 ml
68	2ml
69	5 ml
72	Es wurde mit 5 ml eluiert und dann auf 5 ml aufgefüllt
82	10,0
98	10 ml
124	10 mL
128	5
132	6 mL
135	2
141	10 ml
156	3
167	6 mL filled to 10 mL with purified water
174	5
186	10ml
192	5mL
199	3ml
207	5
218	5 mL
228	10 ml
238	5 ml
256	2.5
258	5
264	5 mL

Aldehydes 2023

Participant	Desorptionvolum
267	5 mL
296	10

Participant	Chromatography system HPLC
13	Agilent 1290 system with G7104A 1290 Flexible pump, G7117A 1290 DAD FS and G7167 B 1290 multisampler.
17	Agilent LC-UV Detektion,
30	Alliance e2695 / PDA 2998
38	HPLC-DAD ; InfinityLab LC 1260 der Firma Agilent
42	Agilent Typ 1260 Infinity
46	Quat. Pumpe, DAD, HiP-Sampler von Agilent
50	Agilent 1200: Pumpe: 1200 Binary Pump G1312-64015-RNC Autosampler: 1200 Standard Autosampler G1329-64010-RNC Säulenofen: 1200 TCC SCV Säulenofen G1316-64011-RNC Detektor: 1200 Diode Array Detector G1315-64013-RNC
51	Pump: Agilent 1260 Infinity II G7111B - Detector: Agilent UV 1260 Infinity II G7114A
52	Flexar quaternary pump, Flexar PDN Detektor, Flexar LC autosampler von Perkin Elmer
53	VWR 5160, VWR 5430 DAD, VWR 5260+ Thermostat
56	pump LPG 3400 detector WD 3100
60	Agilent 1260 Quat Pump, 1260 DAD VL+
62	quaternary pump + UV/VI detector
67	I used a quaternary pump and UV/VIS/DAD detector
68	DAD Detektor, HiP Sampler, quaternäre Pumpe
69	Elite LabChrom Merck Hitachi, PumpL-2130 and Autosampler L-2200
72	Waters 2695 mit Waters 996 DAD
82	Agilent 1260 Infinity II, Quat. Pumpe G7111B, DAD G7117C mit 60mm Messzelle, Autosampler G7129A mit 100µL Probenschleife
98	HPLC-System LC-2030 Plus
124	Shimadzu LC-2050 UV
128	Agilent Infinity 1260
132	Waters Alliance 2695 with Waters 2998 PDA
135	Agilent 1260 Infinity II
141	Agilent Technologies 1260 Infinity Quaternary; Agilent Technologies 1260 Infinity TCC Diode Array Detector
156	PDA-UV
167	Waters e2695 HPLC
182	Shimadzu
186	Quaternary pump and photodiode array detector
192	Agilent 1260 , Agilent 1260 II

Aldehydes 2023

Participant Chromatography system HPLC

199	Agilent
207	Agilent 1260 Infinity HPLC-DAD
218	Shimadzu LC-20 mit SPD-M20A
228	Agilent Infinity 1260
238	quaternaire pump + UV detector + multivial sampler AGILENT 1260
256	Agilent 1100 Series; Pumpe: G1311A Quaternary Pump, Detektor: G1315B, Autosamples: G1313A
258	Waters Acquity H-Class with UV detector
264	Shimadzu Nexera i-series
267	Agilent HPLC-DAD 1260
296	Perkin Elmer Series 200

Participant Refrigerated autosampler Analytical column

13	18°C	Agilent Extend C18 4,6mm x 150mm 5µm
17	ja, 8°C	Poroshell 120 EC-C18, 4,6x50mm,2,7µm
30	no	Restek Allure AK 4.6 mm 5 µm
38	20°C	Novak-PAK C18 4µm, 3,9 x 75mm der Firma waters
42	nein	Prontosil 120-5C 18 ace-EPS, 250x4,6 mm
46	Nein	C18-Silica Trennsäule
50	20°C	Restek Allure AK 5µm, 200x4,6 mm
51	No	J.T. Baker Octadecyl (C18) 250 x 4.6 mm - 5 µm
52	nein	Phenomenex Luna 5µm, C18 100 Å , 250X4,6mm
53	Ja, 30°C	Purospher® STAR RP-18e Hibar® RT 3µm 250-3
56	yes, 15°C	acclaim RSLC Carbonyl 2.1*100 mm (Thermo)
60	No	Allure C18 5µm 150x4,6mm
62	no- ambient temperature	Ascentis RP-Amide HLPC Column
67	NO	I used a ALLTECH-ALLTIMA C18 3µ particles, 150 mmx3.2 mm
68	Nein	Agilent Poroshell 120 mit Vorsäule
69	No	Ascentis RP-Amide 25 cmx4,6 mm
72	nein (Raumtemperatur)	Phenomenex, Synergi 4µm Max-RP 80A, 250x4,6mm
82	der AS ist nicht temperiert	Agilent Poroshell 120 EC-C18, 100mm x 4,6mm x 2,7µm
98	Nein	LiChrospher 100RP18, 5 µm, 250x4 mm, Merck
124	no	Restek Raptor C18
128	No, Room Temperature	Poroshell 120, EC-C18, 4.6x150 mm

Aldehydes 2023

Participant	Refrigerated autosampler	Analytical column
132	no	Restek Allure AK
135	ja, 10°C	M&N 250/4,6 Nucleodur 100-5 C18ec
141	no, autosampler at room temperature	Agilent Poroshell 120 EC-C18 50x4.6 mm, 2.7µm cat. no. 6999975-902,
167	Room temp	Waters Symmetry C18 3,5 µm
174	yes, 4°C	C18 25 cm* 4,6 mm*5 µm
182	ja	C18
186	Yes, 4°C	Acquity UPLCBEH C18, 50*2.1 mm, 1.7µm
192	23°C	Formaldehyde,Acetaldehyde : InertSustain C18 HP , Propionaldehyde,Butyraldehyde : Inertsil ODS-HL
199	nein	C18
207	-	Phenomenex Kinetex 2,6 µ 100 x 4,6 mm
218	5 °C	C18 Reversed Phase (250 x 4,6 mm; 5 µm)
228	Ungekühlt	Kinetex C18
238	No	SBC18
256	nein	Supelcosil LC-18, 25 cm x 4.6 mm, 5 µm
258	No	Waters Acquity BEH C18, 1.7µm 2.1 x 50 mm
264	Yes. 8°C	Acclaim RSLC Carbonyl 2.2 µm - 100*3 mm
267	No, room temperature	Waters Symmetry C18, 250 mm x 4.6 mm x 5 µm
296	no	Ascentis Express C18 100x4,6mm 2,7um

Participant	Mobile phase HPLC
13	Gradient composition milliQ:Acetonitrile
17	Wasser + 0,1% Ameisensäure, Acetonitril + 0,1% Ameisensäure
30	Acetonitrile / Water
38	H2O/Acetonitril/Tetrahydrofuran (65/30/5)
42	A: 34 Vol.% Acetonitril / 43 Vol.% H2O / 32 Vol.% Methanol; B: Acetonitril (Gradient
46	THF, ACN und ACN+Wasser, Gradientenlauf
50	Acetonitril / Wasser, Gradient (60 bis max. 95% Acetonitril)
51	H2O/CH3CN
52	Wasser/Methanol/Acetonitril (35/52/13)
53	ACN/Wasser
56	H2O/ACN
60	70% acetonitrile / 30% eau et 100% ACN
62	Acetonitrile/Water 40/60 -> 75/25-> 100/0

Aldehydes 2023

Participant	Mobile phase HPLC
67	Acetonitrile/w ater (30/70)
68	50% Acetonitril, 50% Wasser
69	Acetonitrile-agua
72	Gradientenmethode aus Acetonitril und Wasser
82	ACN/H2O , 60/40 V/V
98	Wasser - Acetonitril 51:49 bis 20:80
124	MeOH/MeCN/w ater gradient
128	Water & Acetonitrile
132	Acetonitrile and w ater
135	Wasser, Acetonitril, THF
141	45% Water/55 % Acetonitril
156	55 ACN
167	AcN w ith 0,1% phosphoric acid
174	60%ACN-40%H2O
186	Acétonitrile/Water/Tetrahydrofuran
192	Water/Acetonitrile
199	Wasser/Acetonitril
207	H2O, ACN/THF
218	Gradientenprogramm Acetonitril/Wasser
228	Wasser/ Acetonitril
238	w ater / acetonitrile
256	Startbedingungen: 30% ACN, 60% Wasser, 10% THF
258	Acetonitrile/w ater
264	Acetate buffer/Acetonitrile
267	Acetonitrile/Water
296	ACN:H2O

Participant	Flow rate HPLC	Wavelength
13	1,3	360 nm
17	0,7mL/min	360 nm
30	1.2	360 nm
38	1,5 ml/min	365nm
42	1	365 nm

Aldehydes 2023

Participant	Flow rate HPLC	Wavelength
46	1 ml/min	360 nm
50	1,4 ml/min	360 nm
51	1.9 mL/min	365 nm
52	1ml/min	365 nm
53	0,35mL/min	355nm
56	0.4 mL/min	360nm
60	1 ml/min	360 nm
62	1 mL/min	360 nm
67	0.6 ml/min	I used 360 nm w avelenght
68	1.000	360.0 nm, Referenzw ellenlänge 550.0 nm
69	1,5 ml/min	UV-visible 360nm
72	1,0 ml/min	250-600 nm, extracted channel 365 nm
82	1,000	354 nm, BW 8nm, Ref.WL 550nm, REF. BW. 80nm
98	1,2	365 nm
124	0.8 mL/min	365
128	0.9 ml/min to 1 ml/min gradient	365
132	1.2 mL/min	350 nm formaldehyde 360 nm for other aldehydes
135	2,30	365 nm
141	1 ml/min	250-500 nm
156	1.2	
167	1,5 mL/min	360 nm
174	1	360 nm
182		verschiedene (substanzabhängig)
186	0.6	360 nm
192	Formaldehyde,Acetaldehyde : 0.4mL/min , Propionaldehyde,Butyraldehyde : 1.2mL/min	360nm
199	0,8ml/min	370nm
207	1,5	360nm
218	1,2 mL/min	360 nm
228	2	360 nm
238	1.4 ml/min	365 nm
256	2.3 ml/min, ab 9.1 Minuten 2 ml/min	360 nm
258	0.8	367 nm
264	1.0 mL/min	360 nm
267	1.5 mL/min	365 nm

Aldehydes 2023

Participant	Flow rate HPLC	Wavelength
296	1	360

Participant	Temperature analytical column
13	40°C
17	30°C
30	30°C
38	30°C
42	23°C
46	40 °C
50	30°C
51	25 °C
52	25°C
53	35°C
56	30°C
60	30°C
62	30°C
67	28 °C
68	35°C
69	40 °C
72	25
82	20°C
98	25°C
124	30oC
128	40 °C
132	30C
135	50°C
141	30 grC
167	40 °C
186	35°C
192	40?
199	30°C
207	30°C
218	50 °C

Aldehydes 2023

Participant	Temperature analytical column
-------------	-------------------------------

228	30°C
238	35°C
256	25 °C
258	40°C
264	28°C
267	25 °C
296	room temperature

Participant	Calibration standard
-------------	----------------------

13	TO11/IP-6A Aldehyde/Ketone DNPH mix from Sigma-Aldrich
17	Einzelstandards, Sigma-Aldrich
30	Mix solution Supelco DNPH Mix-1
38	Formaldehyd-DNHP Standard 500µg/ml in ACN der Firma Restek
42	Mix (Labmix 24)
46	Der Standard wurde aus Einzelstandards hergestellt
50	Carbonyl-DNPH Mix 1, Supelco
51	Custom Carbonyl-DNPH standard - Restek
52	DNPH-Mix Fa. LGC
53	fertiger Standard - TO11/IP-6A Aldehyde/Ketone-DNPH-Mix, Fa. Supelco (Merck)
56	Custom mix ALD_DNPH 100µg/mL Supelco
60	Ready-to-use mix from AccuStandard
62	Purchased at Restek (gamme) - VWR (contrôles)
67	I used a mix ready-to-use purchase from the manufacturer "CPAchem"
68	CARB Carbonyl-DNPH Mix 1 von Supelco
69	Ready to use mix, Isostandards Material S.L.
72	Carbonyl DNPH-Mix 1 + Aldehyde/Ketone DNPH Stock Standard-13 von Sigma Aldrich
82	Als Ausgangs-STD wurde ein Formaldehyd-DNPH-STD c=100µg/ml von Supelco (Prod.-Nr. CRM4M7177) verwendet
98	Mix, Sigma-Aldrich
124	Restek mixture
128	Supelco - Ready to use mix
132	individual derivatized references
135	Einzelstandards, Dr. Ehrenstorfer und HPC Standards
141	ready to use standards

Aldehydes 2023

Participant	Calibration standard
167	Individual standards from LGC
174	Standards are a ready-to-use mix from Sigma-Aldrich
186	Ready-to-use mix from Supelco
192	JSAE-Cabin Aldehyde-DNPH and aldehyde-DNPH mixed standard solution manufactured by Fujifilm Wako Pure Chemical Industries, Ltd.
199	MIX Sigma Aldrich
207	Einzelstandards Supelco
218	Mix (LGC), Mix (Supelco)
228	Fertiger Mix von Accu Standard
238	mix 15 aldehydes 31808 RESTEK
256	fertiger Mix: TO11/IP-6A Aldehyde/Ketone-DNPH Mix (Sigma-Aldrich)
258	Ready to use mix, Supelco TraceCERT CRM 47285
264	Ready to use mix from Restek
267	Ready-to-use mix from Supelco
296	CPA Chem

Participant	Recovery rates
13	No
17	nein
30	no
38	nein
42	nein
46	ja
50	nein
51	Yes
52	nein
53	nein
56	no
60	No
62	no
67	No, my result didn't include recovery rates
68	Ja
69	NO
72	ja

Aldehydes 2023

Participant	Recovery rates
82	Ja. Der Präzisions-STD (c=0,4µg/ml) hatte vor der Probenserie eine Wiederfindung von 99,85% und nach der Probenserie eine Wiederfindung von 99,32%
98	Nein
124	no recovery was used
128	No
132	no
135	nein
141	yes
156	No
167	Yes
174	yes
186	No
192	No
199	nein
207	-
218	Nein
228	Nein
238	No
256	nein
258	No
264	Yes
267	No
296	no