

Agilent Quantitative Test Mixture for the PIONA Analyzer

User manual

33 Components

The quantitative PIONA mix (Part Number CP299107, batch 004) is a mixture of 33 components. Most components represent a different group in the report matrix. The performance check is therefore straightforward and easy to carry out.

The concentration of a component in the mixture is mainly based on its volatility. The mix does not contain components below carbon number C₆, while components with a carbon number of 6 and 7 are present in low concentrations.

99% purity

The mixture is a blend of components with a purity of at least 99% (see Table 1). The sequence of adding is based on the individual boiling point starting with the high boilers. The mixture is weighed on a precision balance with a read-out of three decimals. The amount of component added is from 2.5 grams per component for low boilers and up to 30 grams per component for high boilers. See Table 2 for the sample composition in weight percentages. The mix is filled out in 1 mL ampoules and sealed. Before sealing, the mix is frozen in liquid nitrogen to prevent evaporation and to ensure a constant sample composition.

The sample composition of the mix is checked on several PIONA analyzers in the PINA and PIONA. An example of a PIONA analysis is shown in Figure 1.

How to use the sample

The quantitative mix is used to check the quantitative performance of the analyzer.

As a shortcut method to check the performance of the PIONA analyzer we advise to run a single analysis and to calculate the mean difference between weighed and measured values.

The values obtained should be at least within the following ranges:

-0.2% for each structural group per carbon number

-0.5% for each carbon group

Note: To prevent sample discrimination we advise to cool the ampoule before transferring its contents into a vial. The ampoules are prescored and therefore easy to open.

Table 1. The purity of the chemicals

Component	Supplier	Purity %
Tetradecane	Fluka	>99
Phenylheptane	Aldrich	99
Dodekane	Aldrich	99
Undekane	Aldrich	>99
Trans-decaline	Fluka	>99
2-methylnonane	Fluka	>99
Butylbenzene	Aldrich	99+
Decane	Fluka	>99
Tert.-butylcyclohexane	Aldrich	99+
Isopropylhexane	Fluka	>99
2,2,5-trimethylhexane	TCI	99
Nonane	Fluka	>99
Isopropylbenzene	Merck	>99
o-xylene	Fluka	>99
Ethylcyclohexane	Aldrich	99+
2,2,4-trimethylpentane	Aldrich	99.7+
2-methyl-1-heptene	Fluka	>99
Ethylbenzene	Aldrich	99+
Octane	Fluka	99.5
1-heptene	Aldrich	99+
2,3-dimethylpentane	Aldrich	99+
Toluene	Aldrich	99.9+
4-methyl-1-cyclohexene	Fluka	>99
Methylcyclohexane	Aldrich	99+
Heptane	Fluka	>99.5
4-methyl-1-hexene	Fluka	>99
Cyclohexene	Fluka	>99.5
Cyclohexane	Aldrich	99.9+
1-hexene	Aldrich	99+
4-methyl-1-pentene	Riedel de Hean	99
2,2-dimethylbutane	Fluka	>99
Hexane	Fluka	>99.5
Benzene	Aldrich	99.9+

Suppliers:

Fluka - The Netherlands, Merck - The Netherlands, Aldrich - Belgium,
Riedel de Hean - The Netherlands, TCI - Japan



Table 2. Composition of the test mixture (by weight)

Name: Test mixture PIONA quantitative
 Part Number: CP299107
 Batch Number: 004

Number	Component	Code PIONA/ PIONA-H	Code PIONA	Weight -%
1	Cyclohexane	N6	N6	1.06
2	Cyclohexene	cO6	N6	1.06
3	2,2-dimethylbutane	iP6	iP6	1.05
4	4-methyl-1-pentene	iO6	iP6	1.08
5	Hexane	nP6	nP6	1.07
6	1-hexene	nO6	nP6	0.54
7	Methylcyclohexane	N7	N7	4.21
8	4-methyl-1-cyclohexene	cO7	N7	1.96
9	2,3-dimethylpentane	iP7	iP7	2.09
10	4-methyl-1-hexene	iO7	iP7	0.52
11	Heptane	nP7	nP7	2.10
12	1-heptene	nO7	nP7	0.53
13	Ethylcyclohexane	N8	N8	5.24
14	2,2,4-trimethylpentane	iP8	iP8	4.22
15	2-methyl-1-heptene	iO8	iO8	0.53
16	Octane	nP8	nP8	4.22
17	Isopropylhexane	iP9	iP9	1.34
18	2,2,5-trimethylhexane	iP9	iP9	0.56
19	Nonane	nP9	nP9	3.14
20	Tert.-butylcyclohexane	N10	N10	2.80
21	2-methylnonane	iP10	iP10	0.51
22	Decane	nP10	nP10	5.27
23	Undecane	nP11	nP11	5.26
24	Trans-decaline	pN	pN	6.31
25	Benzene	A6	A6	3.17
26	Toluene	A7	A7	3.22
27	Ethylbenzene	A8	A8	5.30
28	o-xylene	A8	A8	5.29
29	Isopropylbenzene	A9	A9	6.37
30	Butylbenzene	A10	A10	5.26
31	Tetradecane	BP>200	BP>200	4.20
32	Phenylheptane	BP>200	BP>200	6.33
33	Dodecane	BP>200	BP>200	4.18
Total				100

Used abbreviations:

nP = normal Paraffin
 iP = iso Paraffin
 N = Naphthene
 nO = normal Olefin
 iO = iso Olefin
 cO = Naphthenic Olefin
 pN = poly Naphthene
 A = Aromate
 BP>200 = Boiling Point above 200°C

Table 3 gives the expected report values after PIONA analysis. In case of a less extended method, PNA, PINA, PONA or PIANO numbers must be re-grouped in order to get the expected value under those conditions. Consult the PIONA+ manual for specific method information.

Also for the oxygenated modes this sample can be used. The user can add oxygenates to the sample by means of a syringe. The oxygenated components that can be analyzed using the PIONA+ analyzer in any O-mode: MTBE, TAME, ETBE, DIPE, Etrhanol, Propanol, Iso-propanol, Butanol (n-, iso-, sec- or tert-). Consult the PIONA+ manual for specific method information.

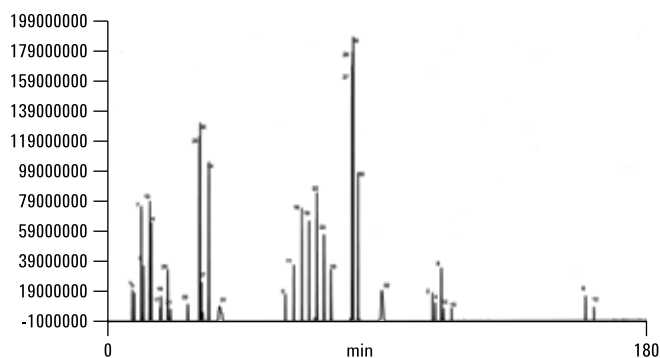
NB. Oxygenated components are not mixed in this particular sample as the sample stability would suffer.

Table 3. PIONA report according to the weighted values.

Carbon#	Saturates:			Unsaturates			Aromatics	Totals
	N	iP	nP	cO	iO	nO		
6	1.06	1.05	1.07	1.06	1.08	0.54	3.17	9.04
7	4.21	2.09	2.10	1.96	0.52	0.53	3.22	14.64
8	5.24	w4.21	4.22		0.53		10.59	24.80
9		1.91	3.14				6.37	11.42
10	2.80	0.51	5.27				5.26	13.83
11			5.26					5.26
Totals	13.32	9.78	21.06	3.02	2.13	1.07	28.61	78.98

Fraction > 200°C: 14.71

Poly Naphthenes: 6.31



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