



**Institute for
Interlaboratory Studies**

Internet: www.iisnl.com

E-mail: iisnl@sgs.com

iis MEMO 1904: Precision data of Calculated Cetane Index Four Variables in Gasoil

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By: G.A. Oosterlaken-Buijs

The Calculated Cetane Index by Four Variable Equation provides a means for estimating the cetane number of distillate fuels from density and distillation recovery temperature measurements. The value computed from the equation is termed the Calculated by Four Variables. Regretfully, no reproducibility is mentioned in ASTM D4737-procedure A:10(2016) and in the equivalent test methods ISO4262:2007(E) and IP380.

Since 1994, the institute for Interlaboratory Studies (iis) organizes proficiency tests for Gasoil. Due to the lack of a literature reproducibility no z-scores could be calculated from the calculated reproducibility for the parameter Calculated Cetane Index Four Variables. However, from previous iis PTs the calculated reproducibilities for Calculated Cetane Index by Four Variable Equation in Gasoil are available and a reproducibility based on this data could be determined.

Therefore it was decided to use the PT data from ten PTs to determine an iis reproducibility for the parameter Calculated Cetane Index Four Variables in Gasoil. The PT data from five Gasoil-ASTM PTs and five Gasoil-EN PTs are presented in table1. From these data an iis reproducibility is calculated using the formulas:

$$\text{std}_{iis}^2 = \frac{(n_1-1) * \text{std}_{\text{calc}1}^2 + (n_2-1) * \text{std}_{\text{calc}2}^2 + \dots + (n_i-1) * \text{std}_{\text{calc}i}^2}{(n_1-1) + (n_2-1) + \dots + (n_i-1)}$$

$$R_{iis} = 2.8 * (\text{SQRT}(\text{std}_{iis}))$$

For future PTs on Gasoil ASTM, starting with the 2019 PT iis19G01EN, iis will use the following iis calculated reproducibility as target reproducibility for Calculated Cetane Index Four Variables: 0.907



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PT	n	mean	std	Rcalc from PT
iis18G05ASTM	98	52.942	0.3113	0.872
iis17G05ASTM	117	54.319	0.3416	0.957
iis16G04ASTM	117	54.460	0.3466	0.970
iis15G04ASTM	100	53.042	0.3163	0.886
iis14G04ASTM	96	52.993	0.4050	1.134
iis18G01EN	128	48.721	0.2602	0.729
iis17G01EN	121	54.937	0.3583	1.003
iis16G01EN	115	55.022	0.2821	0.790
iis15G01EN	116	54.623	0.3260	0.913
iis14G01EN	105	54.859	0.2807	0.786

Table 1: precision Calculated Cetane Index by Four Variables in iis PTs from 2014 - 2018

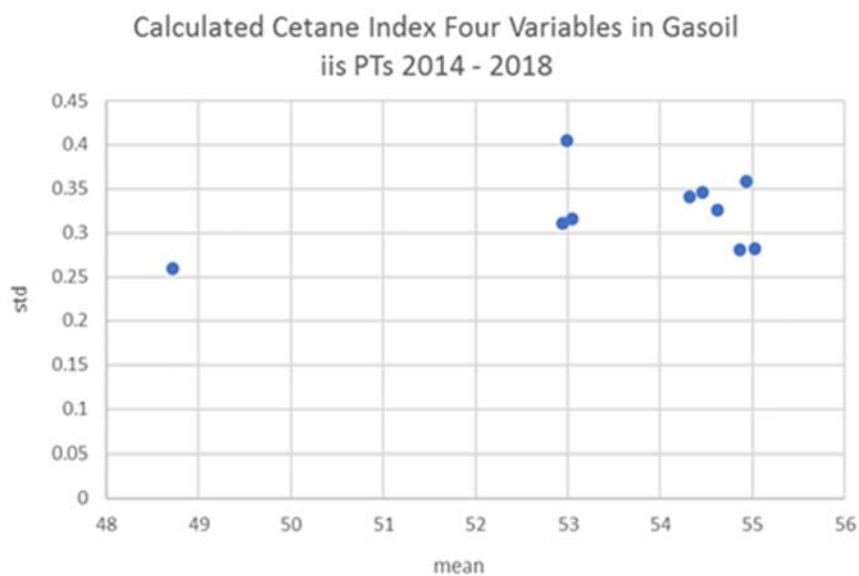


Figure 1: the standard deviation (std) vs mean Calculated Cetane Index by Four Variables in iis PTs from 2014 - 2018