Institute for
Interlaboratory Studies

iis memo 2102: Precision data of Phosphorus Flame Retardants in polymers **April 2021**

Proficiency tests for the determination of total Phosphorus Flame Retardants in Polymers have been organized by the Institute for Interlaboratory Studies (iis) since 2014.
Unfortunately, no standard test method is available for the determination of Phosphorus Flame Retardants (e.g. TCEP, TDCPP, TCPP, TPP) in polymers. Most participating laboratories reported to use an in-house method. This consists of a preparation/extraction step and an analytical step. Method EN71-11 describes the analytical determination of TCEP after migration/extraction. Regretfully in EN71-11:05 only the standard deviation for the repeatability of TCEP is mentioned and no reproducibility requirements of (other) Phosphorus Flame Retardants. The target reproducibility was estimated as follows: the standard deviation was multiplied with 2.8 to get the target repeatability. This was multiplied with 3 to get an estimate for the target reproducibility. This target variation of 8% was used in the PT evaluations from 2014 – 2020.

From the overview in table 1 of the uncertainties RSD_R (in %) as observed since 2014, no quality improvement is visible over the years. It is doubtful whether the target variation based on EN71-11:05 (RSD_R=8%) will ever be met. This goal may be unreachable.
Therefore, it was decided to use the iis PT data gathered since 2014 to estimate a more realistic target reproducibility. This estimated target reproducibility was calculated from the relative standard deviation of 15%.

For future PTs on the determination of total Phosphorus Flame Retardants in Polymers, starting the 2021 PT iis21P01, iis will use the iis estimated target reproducibility calculated from the relative standard deviation of 15%.

	2021	2020	2019	2018	2017	2016	2015	2014
TBP	--	11%	--	--	--	--	--	--
TiBP	11%	--	--	--	--	--	--	--
TCP	21%	16%	12%	--	--	--	--	--
TCEP	11%	11%	15%	17%	13%	9%	12%	23%
TCPP	18%	18%	--	19%	13-15%	--	--	--
TDCPP	13-17%	11%	19%	10%	13-14%	15%	--	--
TPP	--	--	17%	14%	--	--	--	--

Table 1: variation as RSD_R in % from 2014 - 2021