NMKL PROTOCOL No. 6:

REQUIREMENTs FOR THE VALIDATION OF CHEMICAL NMKL METHODS THAT ARE NOT TO BE VALIDATED COLLABORATIVELY

Background

The NMKL Annual Meeting 2011 suggested that NMKL harmonises its requirements for method validation according to the policies of international organisations. This means that methods do not necessarily need to be collaboratively validated in order to be published, and applies primarily to chemical (and sensory) methods, as some microbiological NMKL methods have already been published without validation data.

AOAC INTERNATIONAL has introduced SMPRs (Standard Method Performance Requirements), which are requirements to the method's performance in relation to the purpose of the method. For chemistry, the requirements in the main match those of the Codex Method Criteria.

Working instructions

- The referee and contact persons prepare a draft of the method.
- The laboratory of the referee, or a laboratory appointed (subcontracted) by the referee, performs an internal validation of the method. Results from Proficiency Testing (PT) schemes and results of internal validations for establishing estimates of measurement uncertainty can be used.
- The results of the internal validation are evaluated by the referent and contact persons.
- The results are included in the method text.
- The draft method, including the results of the validations, is reviewed by the national committees for approval, firstly by the national committee of the referee.
- The method is finally reviewed by the chair of the chemical sub committee and the secretary general.
- The method is considered for revision after 5 years.

Validation and requirements for chemical NMKL Methods

Chemical methods should be validated according to NMKL Procedure No. 4 (Validation of chemical analytical methods), or specific protocols such as "Method validation and quality control procedures for pesticide residues analysis in food and feed" Document No. SANCO/12495/2011. The results of the validation performed in a single laboratory, should satisfy the following criteria, where applicable:

Field of application:	Which analytes and matrices is the method applicable to? Is there any maximum limit (ML) for the analyte? If not, what concentrations are relevant to measure (here noted ML). The concentration range should be large enough so that the expected measurement uncertainty (preferably with 99% confidence, so that the expanded measurement uncertainty can be multiplied by a factor of 3) is included.

Limit of Detection (LOD): For ML ≥ 0.1 mg/kg, LOD ≤ ML · 1/10
For ML < 0.1 mg/kg, LOD ≤ ML · 1/5

Limit of Quantification (LOQ): For ML ≥ 0.1 mg/kg, LOQ ≤ ML · 1/5
For ML <0.1 mg/kg, LOQ ≤ ML · 2/5

Precision and recovery: The table below lists the acceptable relative internal reproducibility and repeatability for different concentration ratios and recovery values.

Concentration ratio (C)	Acceptable Reproducibility | Repeatability (%)		Recovery (%)
10^{-1}	5.7	3.8	98-102
10^{-2}	8.0	5.3	97-103
10^{-3}	11	7.5	95-105
10^{-4}	16	11	90-107
10^{-5}	23	15	80-110
10^{-6}	32	21	60-115
10^{-7}	45	30	40-120

The concentration ratio is the concentration including the unit, e.g. 1 mg/kg = 1x1mg/1000000mg= 10^{-6}

Acceptable relative internal reproducibility (%)= $2 \times 2C^{-0,1505}$

Acceptable relative repeatability (%)= $2/3 \times 2 \times 2C^{-0,1505}$

Recovery (%) = $100 x c_f/(c_u+c_A)$

Where c_f = concentration of spiked (fortified) sample
c_u = concentration of non-spiked sample
c_A = concentration of added analyte

For lower levels than given in the table, the internal reproducibility should be as low as possible.

Trueness: Trueness is determined by the use of a certified reference material (CRM) if available. If a CRM is not available, trueness is estimated as described in NMKL Procedure No. 4 (Validation of chemical methods) and in NMKL Procedure No. 9 (Evaluation of method bias using certified reference materials.)
The z-score should not be more than 2.

For qualitative chemical methods, see NMKL Procedure No. 20.