

Proficiency Test Data Interpretation

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An extension to the interpretation, evaluation and visualisation of radioactivity proficiency test exercises (PTEs) are presented in this paper.

In this talk, a modified method of analysing proficiency test data is presented, where submitted PT data are assessed using three different test criteria:

- the ζ -test, to assess agreement (or otherwise) with the assigned value for the PT
- the z-test, which makes a similar assessment, but where the overall performance of the participants can be used to inform the limits of the z-test, and
- the relative uncertainty test, where individual relative uncertainties are assessed against the overall reported relative uncertainties that may be subject to additional constraints

These tests lead to the following outcomes:

ζ -test	z-test	R test	Interpretation
Pass	Pass	Pass	Reported result is acceptable
Pass	Pass	Fail	Reported result is questionable
Pass	Fail	Pass or fail	
Fail	Pass	Pass or fail	
Fail	Fail	Pass or fail	Reported result is discrepant

As stated above, the z-test and R-test rely on an assessment of the quality of reported data. Where a result is 'obviously' wrong (termed a 'blunder', in ISO 13528:2015) are identified using a simple test. Additional outliers may be identified in the remaining data using Peirce's Criterion.

Visualisation of the data will be presented, using data from published proficiency tests and commonly employed techniques. Additionally, a plot (the ProTest plot) using relative deviation as the abscissa and the relative reported uncertainty as the ordinate. This plot is bounded by the limits of the ζ -test, z-test and R-test, resulting in a defined area for results that are acceptable, according to the outcomes of the three tests.

The outcomes of the three tests allow an overall numerical score to be associated with each reported result that code the outcomes in order to inform both the participant and the PT organiser on performance, allowing the quick identification of future strategies and improvements for radionuclide measurement.

The foregoing will be illustrated with data from proficiency tests where the results are in the public domain.