Letter

Repeatability and reproducibility

From Jack Hoppé,
27 Froyle Close,
Maidstone,
Kent, ME16 0RQ
e-mail: jackhoppe@talk21.com

The recent contribution[1] on the language of error and the misconceptions held by students in the early stages of their undergraduate courses is to be welcomed; it should encourage a more positive approach to the whole area of error analysis in undergraduate experimental work. This is an important topic to which, for far too long, only lip-service has been given with the result that many chemistry students complete their degrees without any proper understanding of either the language or the principles of error analysis.

I would like to comment here on one of the terms frequently used in this area that in the last few years has been given a more precisely defined meaning. I refer to the term 'reproducibility', generally taken to be a measure of the consistency of replicate measurements of the same quantity. However, it has recently become common practice, particularly in the field of analytical science,[2] to make a distinction between what has been described[3] as 'within-run precision' and 'between-run precision'. The first of these refers to the 'reproducibility' obtained when the same method is used with the same materials by the same operator using the same apparatus in the same laboratory within a short period of time; this is now referred to as *repeatability*. The second is the 'reproducibility' obtained when the same method is used with the same materials but by a different operator using different apparatus in a different laboratory at a different time. The term *reproducibility* is now generally used for this second scenario. Thus, when an analyst is developing a new method for the determination of a given substance, the repeatability of the method will certainly be explored, but for the method to be accepted as one of general use, the reproducibility (as newly defined) will require determination and will need to compare favourably with the repeatability.

The distinction between the two terms is a useful one of which students should be made aware. Clearly the terms have important applications in a wide variety of quantitative determinations.

References

1. J. Tomlinson, P.J. Dyson and J. Garratt, *U.Chem.Ed.*, 2001, **5,** 1.
2. T. Farrant, *Practical statistics for the analytical scientist*, The Royal Society of Chemistry, Cambridge, 1997. p. 34.
3. J. Mendam, R. C. Denney, J.D. Barnes and M. Thomas, *Vogel's textbook of quantitative chemical analysis*, 6th ed., Prentice Hall, London, 2000. p. 120.