2005 - M. Grabe - Measurement Uncertainties in Science and Technology

1.2 Quotation of Numerical Values and Rounding

Evaluation procedures nearly always endow estimators with dispensable, insignificant decimal digits. To get rid of them, the measurement uncertainty should tell us where and how we have to round and, in particular, how to quote the final result [37].

1.2.1 Rounding of Estimators

First of all, we determine the decimal place in which the estimator should be rounded. Given that the first decimal of the measurement uncertainty differing from 0 turns out to be one of the digits

$$\left.\begin{array}{l}1\text{ or }2\\ \\ 3\text{ up to }9\end{array}\right\}\quad\text{the estimator should be rounded}\quad\left\{\begin{array}{c}\text{in the place to the right}\\ \text{of this place}\\ \\ \text{in just this place}\end{array}\right.$$

Having determined the decimal place of the estimator in which it should get rounded, we round it

$$\left.\begin{array}{r}\text{down,}\\ \text{up,}\end{array}\right\}\quad\text{if the decimal place to the right}\quad\left\{\begin{array}{l}0\text{, up to }4\\ 5\text{, up to }9\end{array}\right.$$

1.2.2 Rounding of Uncertainties

The uncertainty should be rounded up in the decimal place in which the estimator has been rounded.

Sometimes the numerical value of a physical constant is fixed with regard to some necessity. It goes without saying that fixing a physical constant does not produce a more accurate quantity. A possibility to emphasize a fixed digit would be to print it boldly, e.g. 273.**16** K.

Table 1.1. Rounding of estimators and uncertainties

raw results			rounded results		
5.755018...	±	0.000194...	5.75502	±	0.00020
1.9134...	±	0.0048...	1.913	±	0.005
119748.8...	±	123.7...	119750	±	130
81191.21...	±	51.7...	81190	±	60