

Errors & Uncertainty

Chemistry

Random against systematic, and how to combine uncertainties.

Percentage uncertainty of a measurement is the absolute uncertainty divided by the value.

$$\% \text{ uncertainty} = (\text{uncertainty} \div \text{measurement}) \times 100$$

Burette, $\pm 0.05 \text{ cm}^3$ per reading

Two readings.

$\pm 0.10 \text{ cm}^3$ per titre

Titre of 25.00 cm^3

$0.10 \div 25.00$.

0.4%

Combining

For multiplication and division.

Add percentage uncertainties

THE COMMON MISTAKE

✗ **Repeating to remove a systematic error**

✓ **Recalibrating or changing the method**

Repeats average out random scatter. A systematic error shifts every reading the same way and survives averaging.

Reduce percentage uncertainty by measuring larger quantities: the absolute uncertainty stays fixed while the value grows.