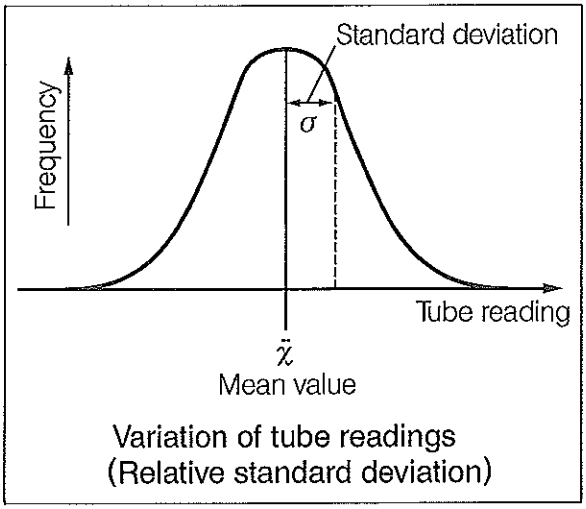
■ Accuracy tolerance in the detector tube method

• Random errors

Even if a sample of definite concentration is measured with high precision detector tubes, the results may be slightly fluctuated. This kind of error is called a random error. Random errors can be ascribed to fluctuations in inner diameters of detector tubes, densities of filling reagents, sensitivities of reagents, or operators who read the tubes. To evaluate random errors, the relative standard deviation is used, which shows in percentage how the reading deviates from the mean value. This value is also called the coefficient of variation (CV):

Relative standard deviation (CV)

$$= \frac{\text{Standard deviation } (\sigma)}{\text{Mean value } (\bar{x})} \times 100\ (\%)$$



Variation of tube readings
(Relative standard deviation)

• Systematic errors

There can be another type of error called a systematic error. Systematic errors may be ascribed to the leakage of sampling pump, incorrectly calibrated detector tubes, improper sampling time, inappropriate storage or usage of detector tubes, or existence of interferents.