

Method Detection Limit (MDL):

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. (Note that, as Dr. William Horwitz once stated, in almost all cases when dealing with a limit of detection or limit of determination, the primary purpose of determining that limit is to stay away from it.). *Source:* Statistics in Analytical Chemistry: Part 7 - A Review, D. Coleman and L Vanatta, American Laboratory, Sept 2003, P. 31.

Precision:

Precision is the numerical agreement between two or more measurements. The precision can be reported as a range for a measurement (difference between the min and max). It can also be reported as the standard deviation or the relative standard deviation. It is a measure of how close together the measurements are, not how close they are to the correct or true value. The precision can be very good and the accuracy very bad. This is a useful measure of the performance of a test method. *Source:* Skoog, D.A., West, D. M., Fundamental of Analytical Chemistry, 2nd ed., Holt Rinehart and Winston, Inc, 1969, p. 26.

Accuracy:

Accuracy is the nearness of a measurement to the accepted or true value. The accuracy can be expressed as a range, about the true value, in which a measurement occurs (i.e. +/- 0.5 ppm). It can also be expressed as the % recovery of a know amount of analyte in a determination of the analyte (i.e. 103.5 %). This is a useful measure and what most customers are interested in when they want to know about the performance of a test method. *Source:* Skoog D.A., West D. M., Fundamental of Analytical Chemistry, 2nd ed., Holt Rinehart and Winston, Inc, 1969, p. 26.

Resolution:

Resolution is the smallest discernible difference between any two measurements that can be made. For meters this is usually how many decimal places are displayed. (i.e., 0.01). For titrations and various comparators it is the smallest interval the device is calibrated or marked to (i.e. 1 drop = 10 ppm, 0.2 ppm for a DRT, or +/- half a unit difference for an octaslide or color chart). Note that the resolution many change with concentration or range. In some cases the resolution may be less than the smallest interval, if it is possible to make a reading that falls between calibration marks. This is often done with various comparators. One caveat is, that resolution has very little relationship to accuracy or precision. The resolution will always be less than the accuracy or precision but it is not a statistical measure of how well a method of analysis works. The resolution can be very very good and the accuracy and precision can be very very bad! This is not a useful measure of the performance of a test method. *Source:* Statistics in Analytical Chemistry: Part 7 – A Review, D. Coleman and L Vanatta, American Laboratory, Sept 2003, P. 34.

Sensitivity:

Sensitivity is the resolution based on how this term is used in LaMotte catalogs. This term is not listed in any of the references. Sometimes it is used for detection limit. It is a confusing term and should be avoided.

Repeatability:

Repeatability is the within-run precision. A run is a single data set, from set up to clean up. Generally, one run occurs on one day. However, for meter calibrations, a single calibration is considered a single run or data set, even though it may take 2 or 3 days. *Source:* Jeffery G. H., Basset J., Mendham J., Denney R. C., Vogel's Textbook of Quantitative Chemical Analysis, 5th ed., Longman Scientific & Technical, 1989, p. 130.

Reproducibility:

Reproducibility is the between-run precision. *Source:* Jeffery G. H., Basset J., Mendham J., Denney R. C., Vogel's Textbook of Quantitative Chemical Analysis, 5th ed., Longman Scientific & Technical, 1989, p. 130.