

7.4 Measurement systems

Analyzer

The analyzer may contain devices that perform the following functions: sampling, sample transport, sample pretreatment, signal processing, data processing. The analyzer maybe an essential part of an automated system. An analyzer working according to a sampling plan as a function of time acts as a monitor.

Blank value

Reading or result originating from the matrix, reagents and any residual bias in the measurement device or process, which contributes to the value obtained for the quantity in the analytical procedure.

Calibration

The set of operations which establishes, under specified conditions, the relationship between values indicated by the analytical instrument and the corresponding known values of an analyte. See Chapter 2 and 18.

Chemical sensor

A device that transforms chemical information, ranging from the concentration of a specific sample component to total composition analysis, into an analytically useful signal. The chemical information, mentioned above, may originate from a chemical reaction of the analyte or from a physical property of the system investigated. Chemical sensors contain two basic functional units: a receptor and a transducer part. Some sensors may include a separator which is, for example a membrane.

Down-time

The loss of time that should be available for analysis.

Note: This might be due to breakdown, maintenance or other factors.

Drift

A slow random change in signal with time.

Electrochemical sensor

Device which transforms the effect of the electrochemical interaction analyte-electrode into a useful signal (e.g. ion selective electrode).

Electrical chemical sensor

Device based on measurements, where no electrochemical processes take place, but the signal arises from the change of electrical properties caused by the interaction of the analyte (e.g. metal oxide semiconductor gas sensors).

Input rate

The number of samples that are processed by the instrument divided by time of operation (If discrete samples are analyzed).

Note: It should be stated if the residence time is included or not.

Instrumental dependability

Relates to the frequency of failures which interrupt the operation of the instrument.

Note: It can be quantified, e.g. by the frequency of breakdowns or by the availability of the instrument for use when required.

Mass sensitive chemical sensor

Device which transforms the mass change at a specially modified surface into a change of a property of the support material. The mass change is caused by adsorption of mass of the analyte at the oscillator (e.g. piezoelectric sensors).

Magnetic chemical sensors

Devices based on the change of paramagnetic properties of a gas being analyzed (e.g. oxygen analyzers).

Noise

The random fluctuations occurring in a signal that are inherent in the combination of instrument and method.

Optical chemical sensors

Devices, which transform changes of optical phenomena, which are the results of an interaction of the analyte with the receptor part. (e.g. refractive index detector).

Other types of chemical sensors

Based on other physical properties like X-ray, β , γ -radiation etc.

Output rate

The number of results that is produced by the instrument divided by time of operation. (At the analysis of discrete samples).

Reading

Data provided by an instrument.

Receptor part of a sensor

The chemical information is transformed in it into a form of energy, which maybe measured by the transducer. The receptor part maybe based upon various principles: physical, chemical or biochemical.

Residence time

The minimum time interval between the introduction of a specimen and the production of the corresponding result(s).

Result

The value of a quantity obtained by measurement.

Note: The result includes all computation and a statement of the quantity and the appropriate unit.

Shut-down state

The condition of an instrument when it is switched off to conserve energy or reagents or to protect working parts.

Note: This is of particular importance in clinical chemistry.

Shut-down time

The time interval between production of the last result of the instrument and shut-down state.

Signal

A representation of a quantity within an analytical instrument.

Stand-by state

The condition of an instrument where the analytical procedure can begin immediately.

Start-up time

The time interval between turn-on of the instrument and its stand-by state.

Thermometric chemical sensors

Devices based on the measurement of the heat effects of a specific chemical reaction or adsorption, which involve the analyte.

Transducer part of a sensor

Device capable of transforming energy carrying the chemical information about the sample into a useful analytical signal.

Throughput rate

This term is not recommended. See *input* and *output rate*.