10.3.2.1.2 Spectral apparatus with detection and/or measuring facilities

Dispersive or non-dispersive spectral instruments may be combined with one or more means for detecting and/or measuring the spectra. Most of the following refer to dispersive instruments.

A *spectroscope* provides visual observation and evaluation of optical spectra. A *spectrograph* is a combination of a spectral apparatus and *camera*. This enables an image of a spectrum to be obtained. Spectra are recorded by a *photographic emulsion* or other means, e.g., two-dimensional electronic image sensors. A *spectrometer* is the general term for describing a combination of spectral apparatus with one or more detectors to measure the intensity of one or more spectral bands (see Note 1). A *sequential spectrometer* enables the intensity of several spectral bands of radiation to be measured one after the other in time, i.e., sequentially. A *simultaneous spectrometer* has more than one detector and enables the intensities of several spectral bands to be measured at the same time. In a *multiplex spectrometer*, a single photodetector simultaneously receives signals from different spectral bands which are specifically encoded. In the case of *frequency multiplexing*, each spectral band is modulated at a specific frequency. Decoding is achieved by filtering out, by electronic means, the corresponding signals. Frequency multiplexing may be realized e.g., with a *Michelson interferometer*, by changing the path difference between the two interfering beams at a uniform rate. Fourier transformation of the interferogram so obtained yields the spectrum. This method is called *Fourier transform spectrometry* (FTS). A *filter spectrometer* has one or more spectral filters for isolating one or more spectral bands.

Note 1 The words photometer, spectrophotometer, (also photometry, spectrophotometry) are sometimes used to describe some of those instruments and procedures related to them. These words should not be used in spectrochemical procedures because photometry relates to radiation evaluation according to visual effects.