Designation: E 1303 – 95 (Reapproved 2000)

Practice for Refractive Index Detectors Used in Liquid Chromatography[1]

This standard is issued under the fixed designation E 1303; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice is intended to describe tests used to evaluate the performance and to list certain descriptive specifications of a refractive index (RI) detector used as the detection component of a liquid chromatographic (LC) system.

1.2 This practice is intended to describe the performance of the detector both independent of the chromatographic system (static conditions, without flowing solvent) and with flowing solvent (dynamic conditions).

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 386 Practice for Data Presentation Relating to High-Resolution Nuclear Magnetic Resonance (NMR) Spectroscopy[2]

3. Significance and Use

3.1 Although it is possible to observe and measure each of several characteristics of a detector under different and unique conditions, it is the intent of this practice that a complete set of detector test results should be obtained under the same operating conditions. It should also be noted that to specify completely a detector's capability, its performance should be measured at several sets of conditions within the useful range of the detector.

3.2 The objective of this practice is to test the detector under specified conditions and in a configuration without an LC column. This is a separation independent test. In certain circumstances it might also be necessary to test the detector in the separation mode with an LC column in the system, and the appropriate concerns are also mentioned. The terms and tests described in this practice are sufficiently general so that they may be adapted for use at whatever conditions may be chosen for other reasons.

4. Noise, Drift, and Flow Sensitivity

4.1 *Descriptions of Terms Specific to This Standard*:

4.1.1 *short term noise*—This noise is the mean amplitude in refractive index units (RIU) for random variations of the detector signal having a frequency of one or more cycles per min. Short term noise limits the smallest signal detectable by an RI detector, limits the precision attainable and sets the lower limit on the dynamic range. This noise corresponds to observed noise of the RI detector only. (The actual noise of the LC system may be larger or smaller than the observed value, depending upon the method of data collection, or signal monitoring of the detector, since observed noise is a function of the frequency, speed of response and the band width of the recorder or other electronic circuit measuring the detector signal.)

4.1.2 *long term noise*—this noise is the maximum amplitude in RIU for random variations of the detector signal with frequencies between 6 and 60 cycles per h (0.1 and 1.0 cycles per min). It represents noise that may be mistaken for a late-eluting peak. This noise corresponds to the observed noise only and may not always be present.

4.1.3 *drift*—the average slope of the long term noise envelope expressed in RIU per hour as measured over a period of 1 h.

4.1.4 *static*—refers to the noise and drift measured under conditions of no flow.

4.1.5 *dynamic*—refers to the noise and drift measured at a flow rate of 1.0 mL/min.

4.1.6 *flow sensitivity*—the rate of change of signal displacement (in RIU) vs flow rate (in mL per min) resulting from step changes in flow rate calculated at 1 mL per min as described in 4.3.12.

4.2 *Test Conditions*:

4.2.1 The same test solvent must be used in both sample and reference cells. The test solvent used and its purity should be specified. Water equilibrated with the laboratory atmosphere containing minimum impurities is the preferred test solvent for measuring noise and drift. Water for this purpose (preferably purified by distillation, deionization or reverse osmosis) should be drawn, filtered through a 0.45 µm filter and allowed to stand in a loosely covered container for several hours at ambient temperature in the laboratory in which testing is to be carried

[1] This practice is under the jurisdiction of ASTM Committee E13 on Molecular Spectroscopy and is the direct responsibility of Subcommittee E13.19 on Chromatography.

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[2] *Annual Book of ASTM Standards*, Vol 03.06.

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