



Standard Practice for Ion Chromatography Terms and Relationships¹

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1. Scope

1.1 This practice deals primarily with identifying the terms and relationships of those techniques that use ion exchange chromatography to separate mixtures and a conductivity detector to detect the separated components. However, most of the terms should also apply to ion chromatographic techniques that employ other separation and detection mechanisms.

1.2 Because ion chromatography is a liquid chromatographic technique, this practice uses, whenever possible the terms and relationships identified in Practice E682.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety problems, 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:²

E682 Practice for Liquid Chromatography Terms and Relationships

3. Descriptions of Techniques

3.1 *Ion Chromatography*, (IC)—a general term for several liquid column chromatographic techniques for the analysis of ionic or ionizable compounds. Of the many useful separation and detection schemes, those most widely used have been the two techniques described in 3.2 and 3.3 in which ion exchange separation is combined with conductimetric detection. By describing only these two techniques, this practice does not

mean to imply that IC is tied only to ion exchange chromatography or conductimetric detection.

3.2 *Chemically Suppressed Ion Chromatography*, (*Dual Column Ion Chromatography*)—In this technique, sample components are separated on a low capacity ion exchanger and detected conductimetrically. Detection of the analyte ions is enhanced by selectively suppressing the conductivity of the mobile phase through post separation ion exchange reactions.

3.3 *Single Column Ion Chromatography*, (*Electronically Suppressed Ion Chromatography*)—In this technique sample components are separated on a low capacity ion exchanger and detected conductimetrically. Generally, lower capacity ion exchangers are used with electronic suppression than with chemical suppression. Mobile phases with ionic equivalent conductance significantly different from that of the sample ions and a low electrolytic conductivity are used, permitting analyte ion detection with only electronic suppression of the baseline conductivity signal.

4. Apparatus

4.1 *Pumps*—Any of various machines that deliver the mobile phase at a controlled flow rate through the chromatographic system.

4.1.1 *Syringe Pumps*, having a piston that advances at a controlled rate within a cylinder to displace the mobile phase.

4.1.2 *Reciprocating Pumps*, having one or more chambers from which mobile phase is displaced by reciprocating piston(s) or diaphragm(s). The chamber volume is normally small compared to the volume of the column.

4.1.3 *Pneumatic Pumps*, employing a gas to displace the mobile phase either directly from a pressurized container or indirectly through a piston or collapsible container. The volume within these pumps is normally large as compared to the volume of the column.

4.2 *Sample Inlet Systems*, devices for introducing samples into the column.

4.2.1 *Septum Injectors*—The sample contained in a syringe is introduced directly into the pressurized flowing mobile phase by piercing an elastomeric barrier with a needle attached to a syringe. The syringe is exposed to pressure and defines the sample volume.

4.2.2 *Valve Injectors*—The sample contained in a syringe (or contained in a sample vial) is injected into (or drawn into)

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

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.