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Book Reviews: Technical Books Section

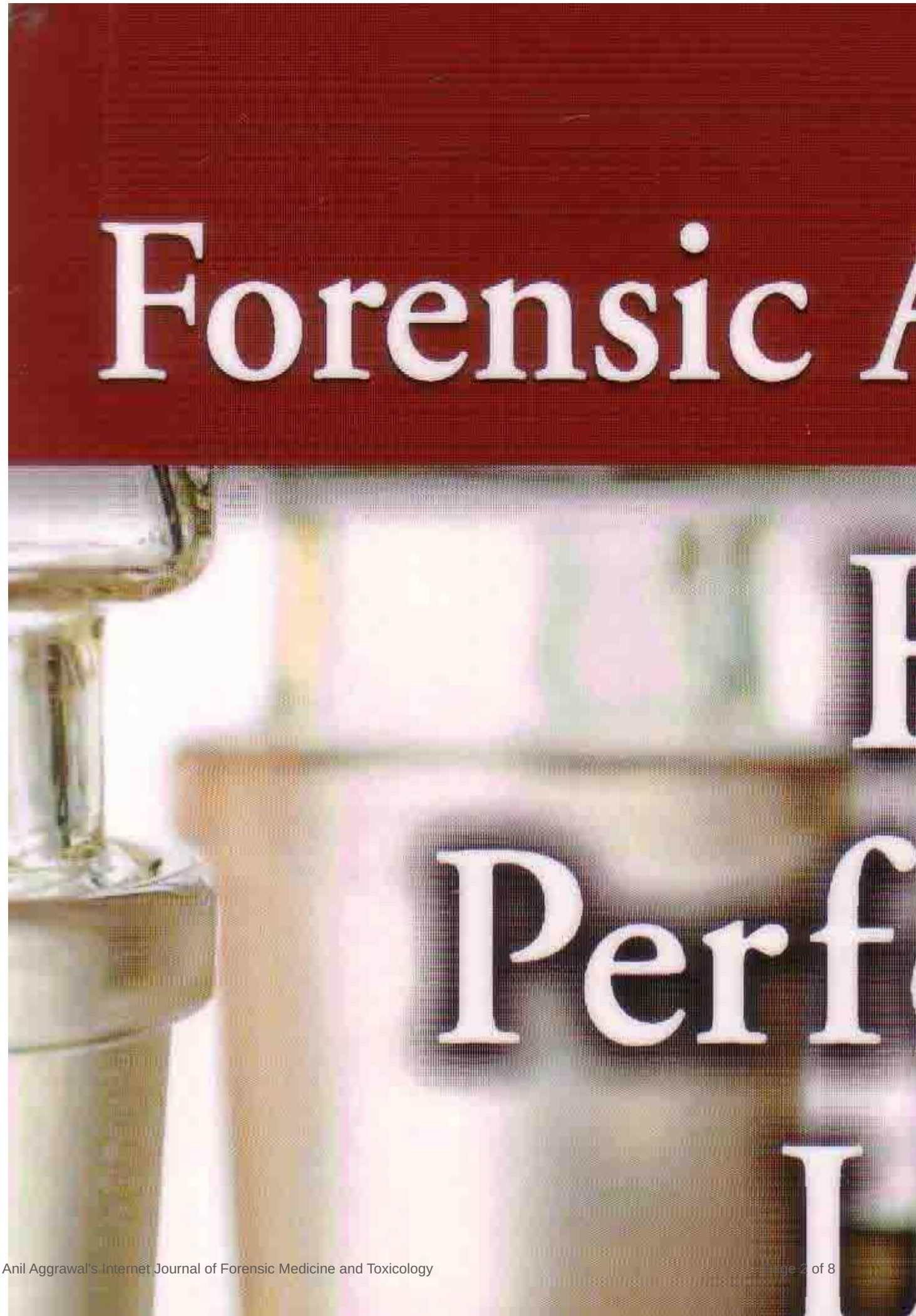
...AN INVALUABLE BOOK FOR FORENSIC SCIENTISTS ...All in all, a very good effort by the authors. This is the first book to the best of my knowledge specifically dealing with the forensic applications of HPLC, and a very good one at that. Highly recommended for all forensic scientists and chemists, especially those who are working in separation science...

Forensic Applications of High Performance Liquid Chromatography, 1st Edition, by Shirley Bayne and Michelle Carlin. Soft cover, 9.2" x 6.1" x 0.7".
CRC Press LLC, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742. , . Publication Date January 25, 2010. 272 pages, ISBN-10: 1420091913; ISBN-13: 978-1420091915 (alk. paper). Price: $59.95.

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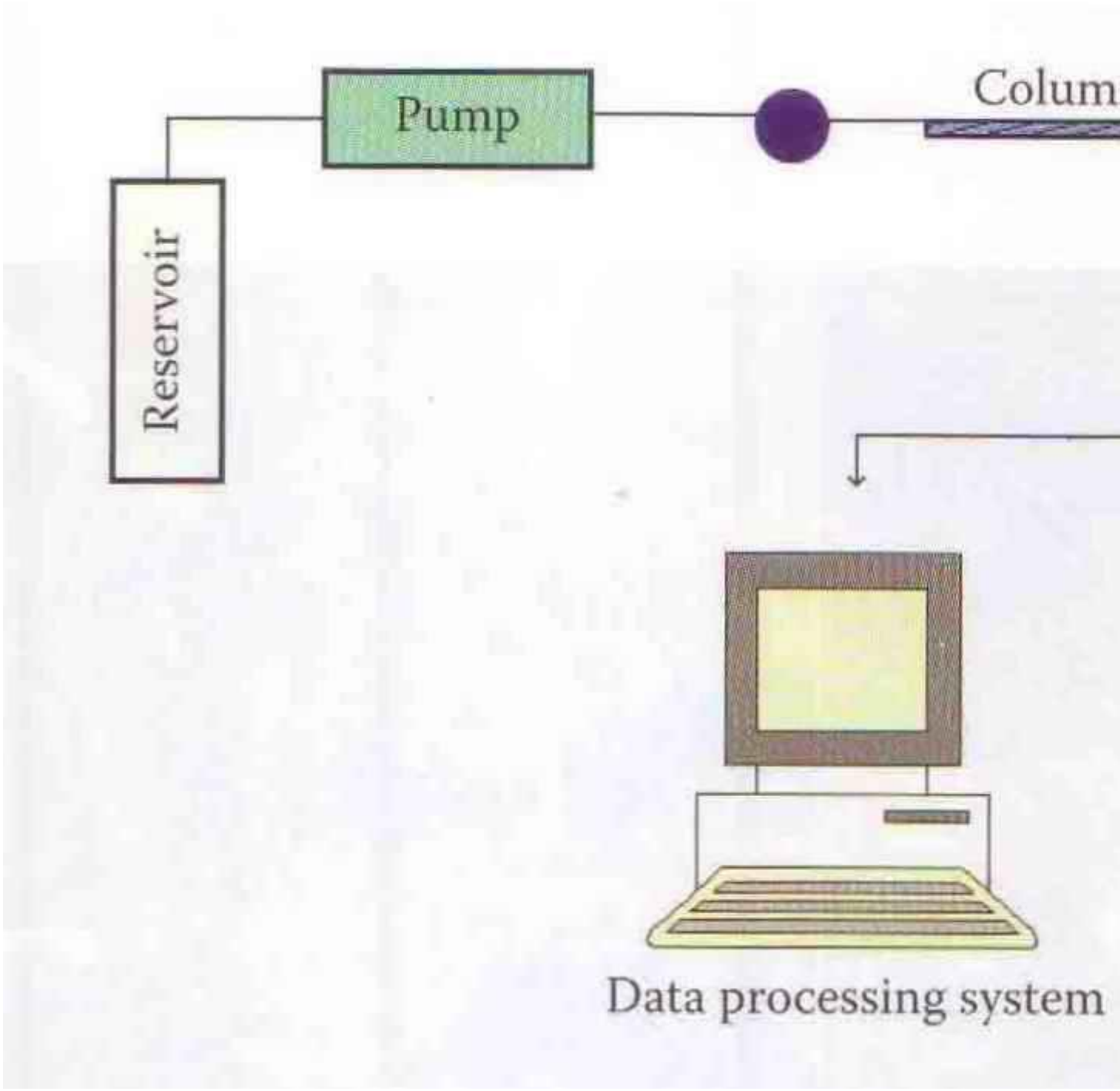

Forensic A
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The book under review is a useful book on the forensic applications of High performance liquid chromatography. Although there are several books in the market on HPLC, very few books are available specifically on the forensic applications.

The authors start with the history of chromatography, explaining how Mikhail Semenovich Tswett isolated chlorophyll from plant material using an early form of chromatography. In 1903 and 1906, he presented his findings in scientific papers, but the studies failed to elicit any interest. The interest was later rekindled when other scientists used the very same methods quite independently.

For the uninitiated, the authors discuss the basic instrumentation related to HPLC. We are told that there is a solvent reservoir containing the mobile phase, the pump which forces the mobile phase through the column at high pressure, the injector port, which allows controlled introduction of the liquid sample into the HPLC instrument, the column, which contains the packed stationary material, and finally the detector and the data processing system (figure on right appears on page 3).

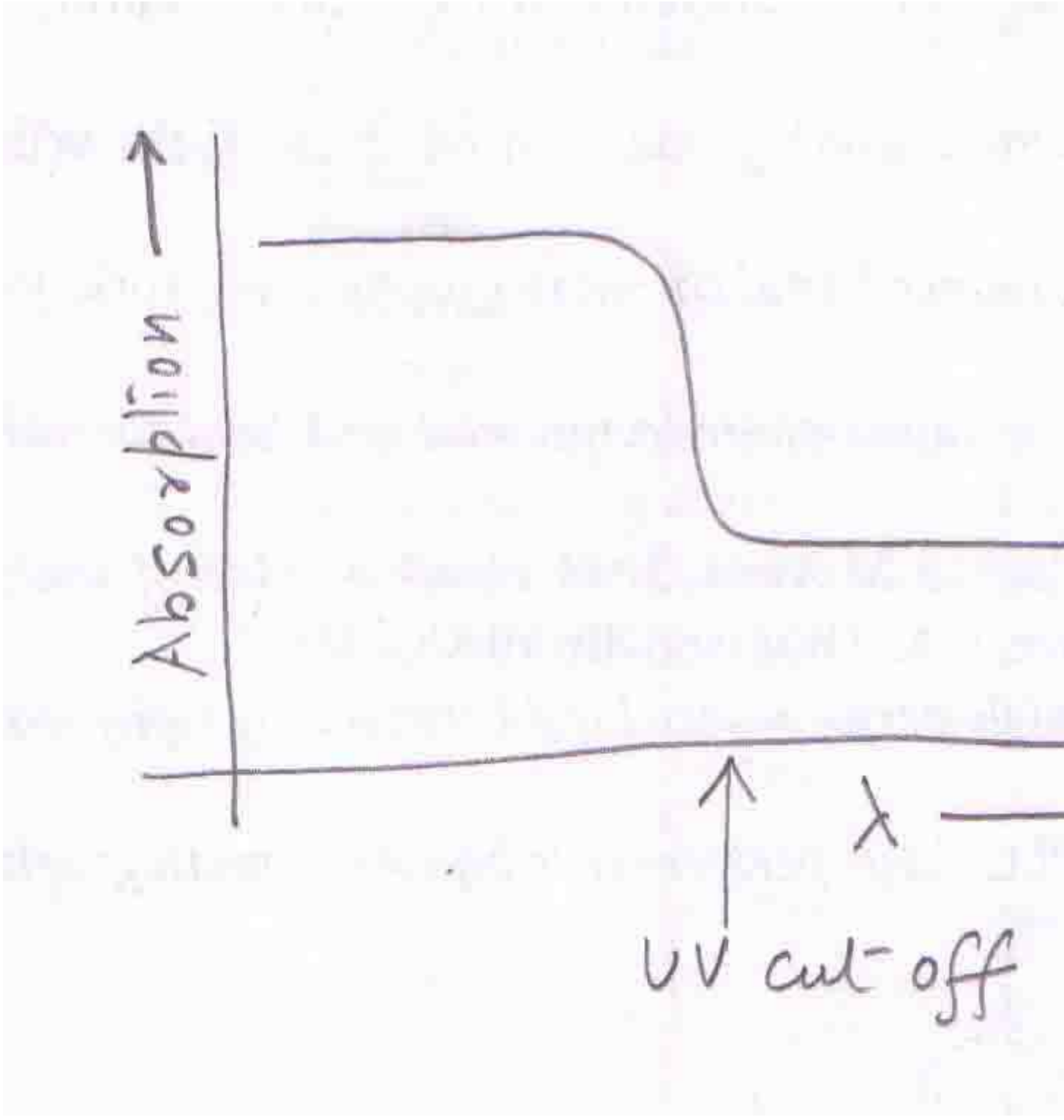
Figure 1.1 Block Diagram of HPLC instrument. This figures appears on page 3. (Please Click to enlarge)



In the next two chapters, the authors go on to discuss the basic principles of HPLC, and preparation of mobile phase, use of buffers and sample preparation. Among other things, we are informed that the solvent must have a lower UV cut-off wavelength than the absorption wavelength of any of the compounds of interest within the sample matrix. Most solvents are more transparent to UV down to a certain wavelength and below that they totally absorb UV so the spectrum may looks as shown (below left).

To be useful with UV detection, the solvent has to have a lower UV cut off then the absorption of any of the sample components. In general, reverse phase eluents have much lower UV cut-off's than normal phase eluents.

The concept of UV cutoff - drawn by reviewer to illustrate (Please Click to enlarge)

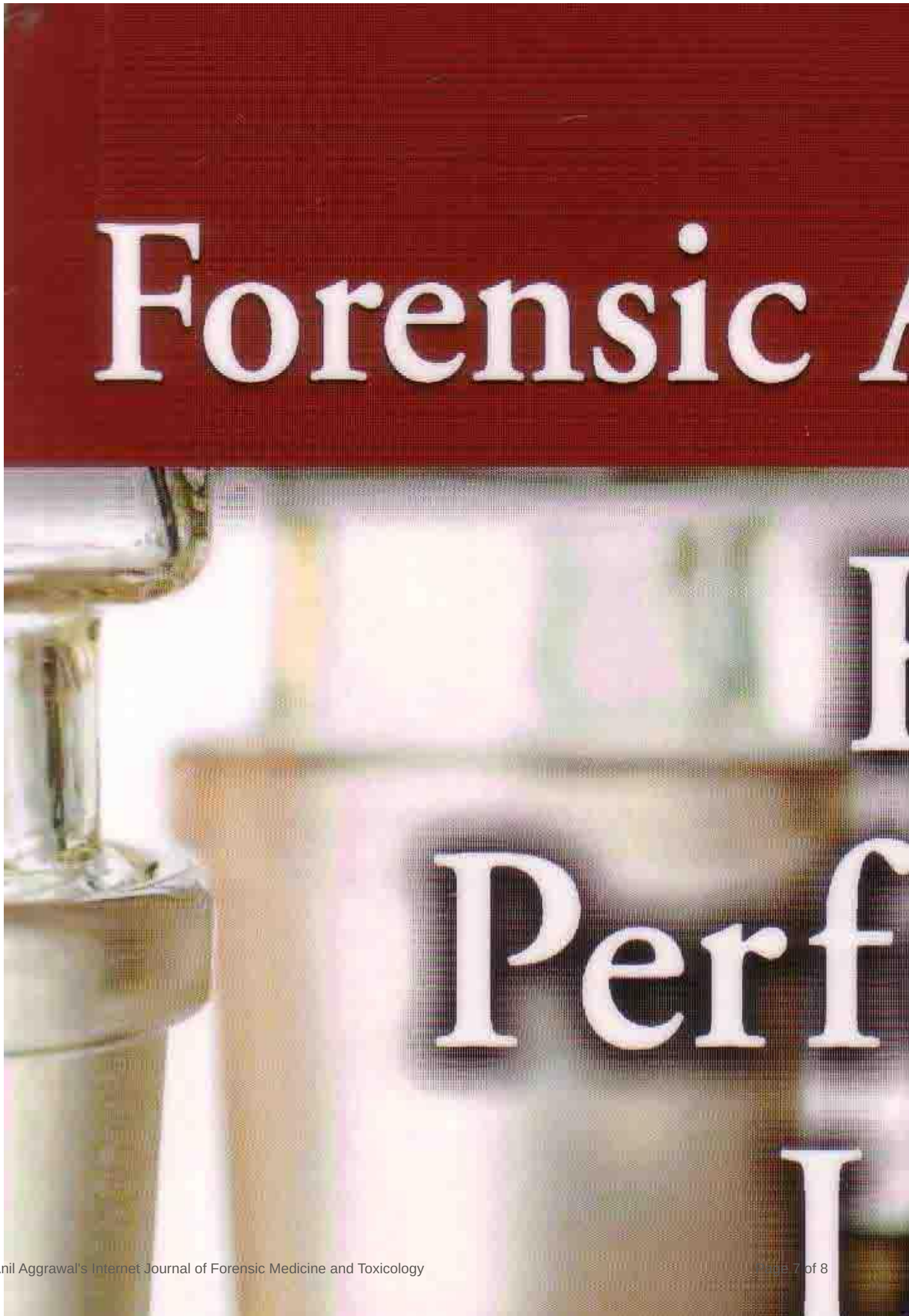


For the uninitiated, a few concepts may be made clear at the outset. When we talk of " **xy chromatography** ", **x** is the **mobile phase** and **y** is the **stationary phase.** Thus in **liquid solid chromatography,** mobile phase is liquid while stationary phase is solid (page 77 of the book under review). In **gas liquid chromatography** (commonly referred to as GLC), gas is the mobile phase and liquid is the stationary phase. In **liquid liquid chromatography** (page 77 of the book under review), both mobile and stationary phases are liquids.

When we talk only of just, say **gas chromatography,** or **liquid chromatography** (as in the term **HPLC**), we refer only to the **mobile phase,** implying that that stationary phase could be anything.

Thus in **HPLC,** (where we talk of liquid chromatography), it is the liquid which is the mobile phase. The stationary phase could be a liquid or a solid.

Whenever liquid is the stationary phase, the liquid is usually supported on some suitable material such as a **diatomaceous earth** or under certain **circumstances silica gel.** Furthermore, the two liquids (in stationary and mobile phases) should be immiscible, but this can not be achieved perfectly.


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Chapter 4 explains all these concepts and much more in a very nice way. I showed this book to many of my students and asked them to read it and they told me that they could understand the concepts of HPLC properly for the first time from this book. Even a number of my own concepts were clarified a great deal. This book explains very nicely the fine line between **partition** and **adsorption chromatography.** Partition chromatography is another name for liquid-liquid chromatography (LLC), **where the analytes of interest are " *partitioned* " between the mobile and stationary phase. Adsorption chromatography** is the name given to liquid solid chromatography, where a surface phenomenon (adsorption) affects the separation.

Forensic applications are specifically discussed in the last chapters. The applications are mainly in five areas – In (i) drug analysis (ii) toxicology (iii) Analysis of explosives (iv) Analysis of colored materials and finally (v) Environmental science.

Each subsection is well explained. An added benefit is a well-explained glossary in the end.

All in all, a very good effort by the authors. This is the first book to the best of my knowledge specifically dealing with the forensic applications of HPLC, and a very good one at that. Highly recommended for all forensic scientists and chemists, especially those who are working in separation science.

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