

## *Main factors limiting the separation power of analytical columns and what could we do about them*

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### **Abstract:**

Besides the very nature of the probe compound used to measure it (i.e., its retention factor and molecular diffusivity), the efficiency of a chromatographic column depends on the column length, the mobile phase velocity, and a combination of factors that characterize the structure of the column bed, the particle size of the packing material or the average width of the through- or macro-pores for monolithic columns. In both cases, the homogeneity of the bed is critical and the quality of the instrument used important. The time available to analysts for producing their results would be the only limiting factor to the column efficiency available if it were not for the necessity to maintain a near optimum flow rate through the column. Thus, the maximum pressure that can be used with a given instrument determines the maximum column efficiency that can be achieved. However, the choice of the compromise between the maximum efficiency achieved and the required analysis time remains at the heart of the problem. There are now very few avenues open to provide faster analyses OR more efficient separations. These seem to be (1) increasing the temperature of operation; (2) increasing the maximum operation pressure; (3) using monolithic columns; and (4) turning toward 2D separations. Each approach presents major difficulties but promises important gains. These will be reviewed and discussed.

**About the Speaker:** Georges Guiochon graduated from Ecole Polytechnique (Paris, France), received a Ph.D. from the University of Paris, was a Professor of Chemistry at Ecole Polytechnique and at the University of Paris, then at Georgetown University, and was appointed a UTK/ORNL Distinguished Scientist in June 1987. His research interests include all the theoretical and practical aspects of gas and liquid chromatography (theory, instrumentation, and analytical and preparative applications) and the problems of physical chemistry related to chromatography, mass and energy transfers, solution and adsorption thermodynamics, detector principles, and the consolidation of beds of fine particles. His current work is in the theory of nonlinear chromatography, the development of separation processes based on chromatography, the understanding of retention mechanisms, and the preparation of efficient chromatographic columns. He has published numerous papers in scientific journals, several books, and is a "highly cited scientist" (ISI). He has organized a few symposia on HPLC and a long successful series of meetings on preparative chromatography. Georges Guiochon has received numerous awards, including the 1978 Dal Nogare Award of the Chromatography Forum of the Delaware Valley, the 1991 ACS Separation Sciences Award, the 1998 ACS Chromatography Award, a 1994 Alexander von Humboldt Senior American Scientist Award, the 2000 Halasz Award of the Hungarian Society of Separation Sciences, and Honorary Doctorates of several European universities (the Technical University of Budapest, Hungary; the University of Pardubice, Czech Republic; the University Ramon Llull, Barcelona, Spain; and the University of Ferrara, Italy).

### **Details:**

Location: **ACE Center, 800 Ridge Pike, Lafayette Hill, PA 19444**  
Times: 5:00 pm Executive Meeting  
5:45 pm Social Hour  
6:30 pm Dinner  
7:30 pm Presentation

Cost: \$30.00 (Cash, Visa, MasterCard, American Express)  
Dinner Menu: Fabulous buffet including a wide variety of entrees, salads and desserts to suit any palate!  
Reservations: Call, FAX or E-Mail Sandy Huff at (800) 356-6140, FAX (856) 753-8484 or [esindustries@msn.com](mailto:esindustries@msn.com) before 4 p.m., Friday, December 8th. Please include your name, employer and work phone number. Please note that "no-shows" will be billed for the dinner.  
Late reservations: Call anyway – we can usually accommodate a couple of extra attendees.

Below is a current list of the 2006/2007 CFDV Executive Committee. Please contact any member of the committee for information about the Forum or to find out how to participate in the Forum or Forum Activities.

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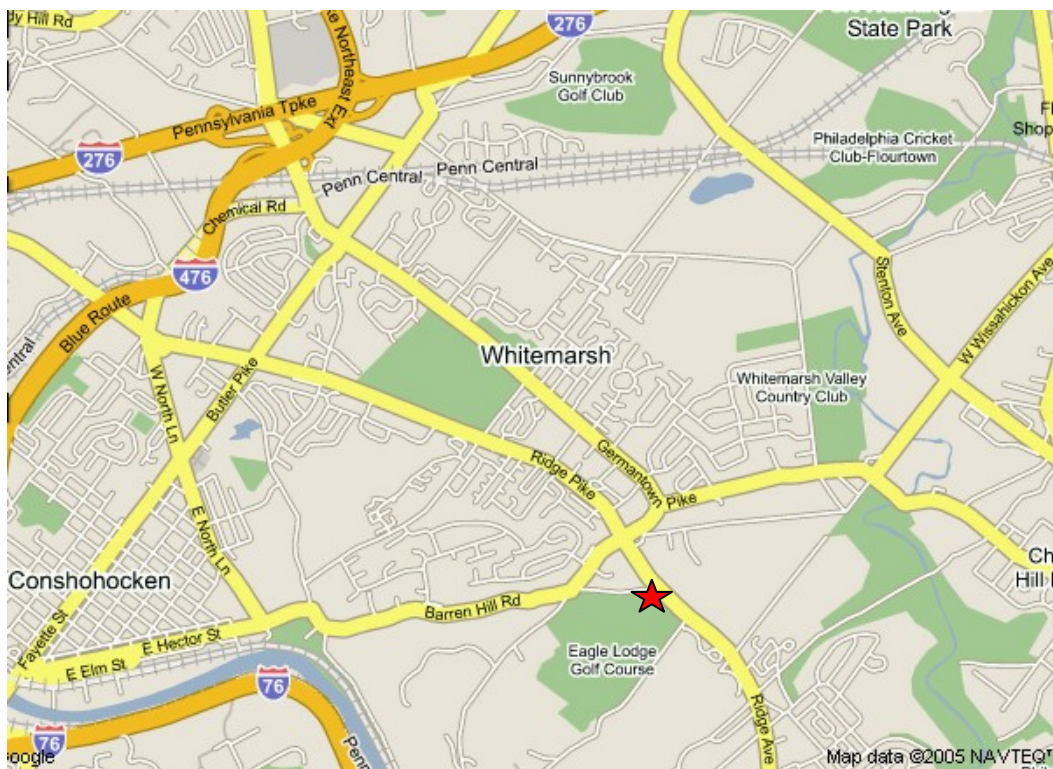


**Please note:**

In inclement weather, cancellations will be accepted up to 3:00 pm on the day of the meeting. If the meeting is cancelled, you will be notified by phone.

**Directions to the ACE Center:**

The map below shows the immediate area around the ACE Center. Detailed Driving directions can be found at: <http://www.aceconferencecenter.com/location.html>



**Nominations for Stephen Dal Nogare Award in Chromatography**

Nominations are being received for the 2008 Stephen Dal Nogare Award in Chromatography given by the Delaware Valley Chromatography Forum. All Nomination Packets should include a letter of nomination and a seconding letter of nomination highlighting accomplishments and qualifications of the nominee. In addition, a complete, up-to-date CV should be included. Deadline for nominations is January 15, 2007. All nominations should be updated annually and will remain active for 5 years. Send all nominations to:

**Mary Ellen P. McNally, Ph.D.**  
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*Stine Haskell Research Center 315/2224*  
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