

The Blue Ridge Chemist

Since 1947 the Official Local Section Publication of the Virginia Blue Ridge Section, American Chemical Society

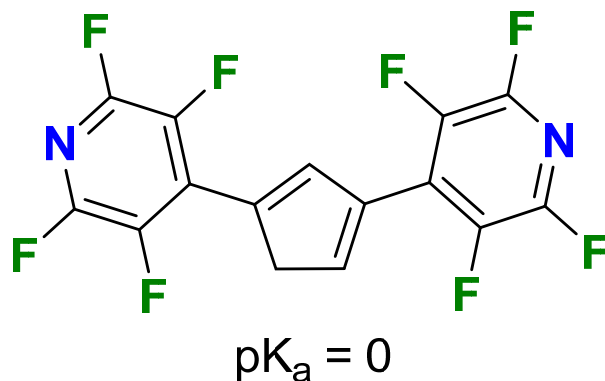
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Roanoke College Hosts the March Meeting (by Zoom)



Meeting Information

- 705th Meeting of the Virginia Blue Ridge Section, American Chemical Society
- Keynote speaker: Paul Deck, Associate Professor of Chemistry, Virginia Tech
- Presentation: “Advancing Carbon Acidity, One pK_a Unit at a Time”
- **Agenda for Thursday, March 18, 2021**
 - Zoom link = <https://virginiatech.zoom.us/j/85104580982>
 - Zoom password = VBRS
 - Social time at 6:30 PM
 - Presentation at 7:00 PM
 - During the presentation, your Zoom microphone will be muted. You may enter questions for the presenter using the Chat feature or wait to the end.
 - Meeting will adjourn by 8:00 PM

Keynote Speaker



The third son of two chemists, Paul Deck grew up in suburban Detroit. He earned his B.S. in Chemistry, from Hope College in 1987 and his Ph.D. from the University of Minnesota in 1993. Paul then spent two years postdoctoring at Northwestern University, where he met his wife, Dr. Carla Slebodnick. Carla is also a chemistry professor at VT. Paul has received several awards including National Science Foundation graduate and postdoctoral fellowships, the NSF Career Award, the Research Corp. Cottrell Scholarship, the ACS E. Ann Nalley Award for Regional Volunteer Service, as well as premium teaching and service awards within his department and within the VT College of Science. When he is not teaching or working with his students in the lab, Paul enjoys cooking, woodworking, reading, and especially music. Paul and Carla have two daughters, ages 18 and 14.

Advancing Carbon Acidity, One pK_a Unit at a Time

Ordinarily, we don't think of carbon-hydrogen bonds as particularly acidic, especially in comparison to bonds between hydrogen and more electronegative elements like oxygen or the halogens. But the great miracle of synthetic organic chemistry allows us to place C—H bonds into a wide variety of structural contexts and thereby modify their reactivity with a gratifying degree of rational control.

A quick Google search for “carbon acids” will turn up compounds like malonitrile or pentanedione, which are acidic by virtue of the electron-withdrawing character of the cyano (CN) and acetyl (COCH₃) substituents. Their acidities ($pK_a = 10.2$ and 13.3 , respectively) are remarkable when one considers that the parent (unsubstituted) compound on which they are based, methane, is probably just about the weakest carbon acid ($pK_a > 50$) that one can imagine.

Therefore, in designing new and stronger carbon acids, we thought it would make more sense to start with a hydrocarbon that is *already fairly acidic on its own*, and cyclopentadiene ($pK_a = 15.8$) is a good choice because its conjugate base is stabilized by aromaticity, and because it is possible to attach up to five electronegative substituents. For the past several years, we have been making cyclopentadiene derivatives that are increasingly acidic, and our most acidic compound presently stands at $pK_a = -6.0$.

So far, our strongest carbon acid is not a contender for the world's record, but we are stepping carefully because we need to be sure that our acidities are determined with precision. Because our compounds are fluorinated, we can make our acidity measurements using ¹⁹F NMR spectrometry. In this presentation I will describe how we make our cyclopentadiene derivatives and how we measure their acidities. I will also explain the strengths and limitations of our acidity determinations and describe some possible applications of our strongest carbon acids.

I wish to acknowledge the students, past and present, who have worked on this project with me.

Section News: Virginia Blue Ridge Section 2021 Officers

VBRS is pleased to announce its officers, committee chairs, and appointed personnel for 2021.

Chair-Elect – Jesse Kern, Department of Chemistry, Randolph College

Chair – Samrat Thapa, Department of Chemistry, University of Lynchburg

Past Chair – Maggie Bump, Department of Chemistry, Virginia Tech

Secretary – Paul Deck, Department of Chemistry, Virginia Tech

Treasurer – Jeremy Stegall, Eastman Chemical Company

Councilor – Gary Hollis, Department of Chemistry, Roanoke College

Alternate Councilor – Jason Crumpton, Department of Chemistry, University of Lynchburg

Nominations Committee Chair – Gary Hollis, Department of Chemistry

Awards Committee Chair – Christine Hermann, Department of Chemistry, Radford University

National Chemistry Week Committee Chair – Maggie Bump, Dept of Chemistry, Virginia Tech

Public Relations & Safety Committee Chair – Jim Tung, Hargrave Military Academy

Chemistry Olympiad Committee Chair – Kim Lane, Department of Chemistry, Radford University

Budget & Finance Committee Chair – Jeremy Stegall, Eastman Chemical Company

Secondary Education Committee Chair – Steve Smith, Roanoke Valley Governor's School

Webmaster – Jim Tung, Hargrave Military Academy

Newsletter Editor – Paul Deck, Department of Chemistry, Virginia Tech

Please note that the annual meeting with awards and poster session, traditional held in April at Radford University, has been cancelled due to the pandemic. However, the April 2021 issue of *The Blue Ridge Chemist* will still be published and will contain the names and institutions of our many awardees. – Ed.

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