College Chemistry Canada
La Chimie Collégiale au Canada

Newsletter

VOLUME 48, ISSUE 5 FEBRUARY, 2026

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CONTRIBUTED ARTICLE:

Author Biography

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With entropic fervor, I have taught chemistry at Arizona Western College (AWC) for three decades. AWC is a public, two-year community college located in the far southwestern corner of the US state of Arizona. About a decade ago I experienced an epiphany of sorts that resulted in the expansion of my teaching portfolio with the inclusion of higher engagement instructional strategies. I am a proponent of a cross-disciplinary collaborative teaching approach as a counter-weight to the (still) prevalent discipline specific-siloed approach commonly employed in STEM classrooms. My teaching focuses on relating chemistry concepts and phenomena to current events (local, regional, or continental in scale) and everyday consumer products (such as food) students can identify with. Interests include kayaking, archery (recurve bow), woodworking, fly fishing, and cartography. Bucket list items include walking (and when possible, paddling) across North America from Seattle to Cape Breton (Nova Scotia), canoeing the perimeter of Lakes Superior and Huron, and spending a summer hanging out with the exquisitely elegant brown bears of the Kamchatka Peninsula (Russia).

Scurvy and Chemistry: What's the Connection?

In my three decades teaching first- and second-year undergrads I have observed that most students do not lack interest in science, including chemistry. Rather, they lack interest in chemistry courses that overwhelmingly emphasize memorization of facts (which are soon forgotten), 'way-out-there' abstract theoretical concepts (atomic orbitals, MO theory), and seemingly endless mathematical exercises converting grams to moles (vice versa), and the list goes on. As I see it, this teaching/learning approach gives a miserably low percent yield on return, meaning that highly impressionable first-semester (year) students taking first semester general chemistry find it a bore, question its relevancy, and end up contributing their intellectual talents and brain power to some other discipline. How can this brain drain away from chemistry be slowed (hopefully)? By emphasizing the relevancy of chemistry to everyday consumer products. Below is a brief description of a GChem 1 classroom activity I developed based on chemistry's relationship to scurvy, the scourge of sailors during the history-altering Age of Sail.

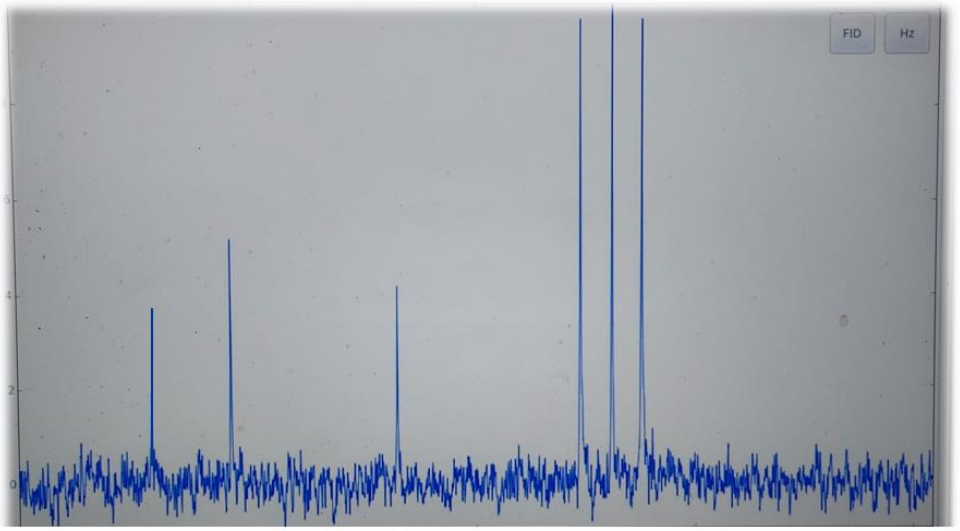
The story begins with students determining the concentration of an antioxidant (AO) in a simulated fruit beverage via titration with iodine. The chemical identity of the AO is not revealed anywhere in the lab writeup. All that students know is that the analyte is an antioxidant. No molecular weight. No molar mass. No molecular formula. They don't even know that the AO is or is not organic in composition.

The class meeting following the titration lab scurvy and its relationship to chemistry is told. Students find out that scurvy occurs on account of a deficiency in ascorbic acid (vitamin C), an organic molecule. But they still don't know the structure of ascorbic acid, only its relationship to scurvy. A chronic deficiency in ascorbic acid leads to scurvy.

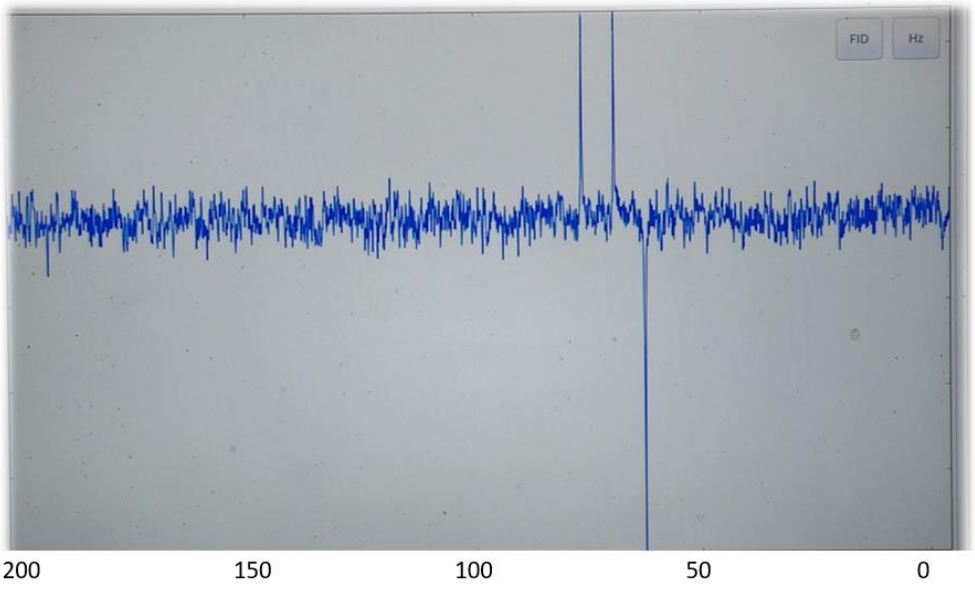
I then give students ^{1}H decoupled and DEPT-135 ^{13}C NMR spectral data (see next page). Students are already familiar with organic structure as they have done two consecutive model building labs emphasizing constitutional isomers of organic molecules; and they have done a lab focusing on ^{13}C NMR spectra, isotopomers, and practice analyzing ^{1}H decoupled and DEPT-135 spectra.

To help students analyze the important information in the two ^{13}C NMR spectra, they complete the table on the page following the spectra.

^{1}H decoupled-^{13}C NMR for the mystery AO



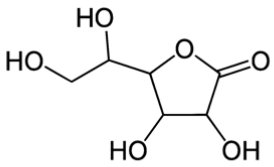
DEPT-135 ^{13}C NMR for the mystery AO



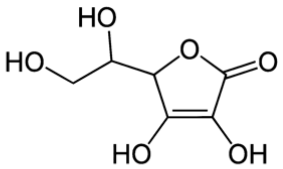
	Statements regarding AO	Answer
	total # Cs in AO =	
	# saturated Cs in AO =	
	Does AO have a carbon or carbons participating in a double bond (db)- YES or NO?	
# saturated Cs with _?_ # Hs bonded to it	zero	
	one or three (odd)	
	two (even)	
# unsaturated Cs with _?_ # Hs bonded to it	zero	
	one	
	two	

Upon completing the table, students then take what they learned and determine which choice below, if any, is the structure for ascorbic acid? What about the other three choices? What reason or reasons did students employ to rule out the other three choices? To find out they also have to provide evidence/rationale why they ruled out the other choices. This emphasizes the notion that there are reason(s) for choosing and not choosing. Both decision pathways require evidence to support the decision. Such is the nature of scientific inquiry. Peace out…

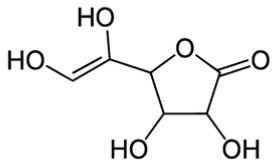
(1)



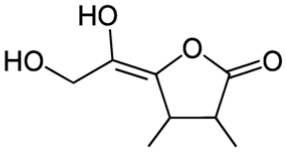
(2)



(3)



(4)



52nd College Chemistry Canada Conference

Chemistry for All

Nunavut Arctic College
Nunatta Campus

Iqaluit, NU
29 May – 01 June 2026



Details for the 2026 College Chemistry Canada Conference can be found at the conference website.
Registration and abstract submission is now open!

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