

# The Alberta Science Teacher



Volume 34, Number 3

June 2016

## The Science of Success: Reaching Potential

November 17-19, 2016  
Banff Conference Centre

Register at: [https://event-wizard.com/  
TheScienceOfSuccess/0/welcome](https://event-wizard.com/TheScienceOfSuccess/0/welcome)




**Hayley  
Wickenheiser**

4x Olympic  
Gold Medallist



**Dr. Maria Sirois**

Psychologist  
Author  
Motivational Speaker



**New format and activities  
including nighttime astronomy!**



@ATASciCouncil



ATA Science Council

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## Editor's Message

This issue of *The Alberta Science Teacher* highlights the upcoming Science Council annual conference in Banff, materials for increasing student interest in chemistry, the wonderful world of glycomics and a science teacher's insightful reflection. You never know what may inspire you!

If you are looking for a way to be a lead educator in Alberta, the following positions on the Science Council executive will be open in November: secretary, elementary director and assistant conference director. Attend an amazing science conference in Banff (see the details in this issue), and be sure to make time for the annual general meeting, to be held at the Banff Centre on Friday, November 18, at 11:45 AM–1:00 PM.

I know that time is precious for educators, but I am respectfully asking you to volunteer a little time and submit an article for the next issue of *The Alberta Science Teacher*. Do you have some great stories or resources to share? Have you attended a fantastic PD activity? Or have you been doing something creative, innovative or inspiring with your students? If you answered yes, then please share your experience. Send your contributions to [trinity.ayres@cssd.ab.ca](mailto:trinity.ayres@cssd.ab.ca).

Looking forward to the next issue!

*Trinity Ayres*

## Specialist Council Conference Grants

The ATA Educational Trust is a registered charitable organization closely affiliated with the Alberta Teachers' Association. Each year, the trust offers bursaries and grants to Alberta teachers and education researchers.

The trust's grant program encourages teachers to attend specialist council conferences, and to develop resources or undertake research in education that will be of practical value to colleagues.

Each year, the trust awards a number of \$500 grants to defray the costs associated with attending an ATA specialist council conference. Eligible expenses include registration, accommodation, fuel and food. Only expenses not covered by other grants will be considered for compensation.

To apply for this grant, please complete and mail the application form by **September 30, 2016**. The form is included with this newsletter, but it can also be downloaded at [www.teachers.ab.ca](http://www.teachers.ab.ca) (For Members > Grants, Awards and Scholarships).

# Conference 2016

**P**ick up your conference registration package at the Kinnear Centre for Creativity and Innovation, Banff Centre, on Thursday, November 17 (6:00 PM–9:00 PM) or Friday, November 18 (7:00 AM–11:00 AM).

The registration package will include your name tag. You must wear your name tag at all times, as it will ensure entrance to your chosen sessions, including the Friday-night banquet gala and Olympian Hayley Wickenheiser’s keynote address on Saturday. Reprinting your name tag is not an option.

<b>What:</b>	Science Council Conference 2016: “The Science of Success: Reaching Potential”
<b>When:</b>	November 17–19, 2016
<b>Where:</b>	Banff Centre, Banff
<b>Who:</b>	You, a four-time Olympic gold medallist and a few of your mutual friends
<b>Why:</b>	Outstanding science education PD
<b>How:</b>	Go to <a href="https://event-wizard.com/thescienceofsuccess/0/welcome/">https://event-wizard.com/thescienceofsuccess/0/welcome/</a>

## Conference Schedule

### Thursday, November 17

6:00 PM–9:00 PM Registration and snacks in the exhibits area  
Tours of the site given every half-hour

### Friday, November 18

7:00 AM–11:00 AM Registration  
7:00 AM–7:45 AM Yoga in the mountains with Danika or trail run with Greg  
8:15 AM–9:00 AM Keynote address by psychologist and author Maria Sirois  
9:00 AM–4:00 PM Exhibits area displays  
9:15 AM–11:30 AM Breakout sessions (45-minute or 1.5-hour sessions)  
11:45 AM–1:00 PM Lunch and AGM  
1:15 PM–3:30 PM Facilitated workshops (predetermined and flexible themes)  
4:30 PM–6:30 PM Organized activities: volleyball tournament (beginner and intermediate, with prizes) or cooking lesson with Rekha (location TBD)

6:30 PM–midnight Banquet gala  
6:30 PM Buffet starts  
7:15 PM Awards  
7:30 PM Canadian Space Agency keynote  
8:30 PM–midnight Dance to live music by Vinyl Fantasy (hits from the 1950s to now)  
Nighttime astronomy with Ian (bring your own telescope . . . or not)

### Saturday, November 19

8:00 AM–8:45 am Yoga in the mountains with Danika or trail run with Greg  
9:00 AM–12:00 PM Exhibits area displays  
9:15 AM–10:15 AM IDEA shares (interesting, different, exciting, advanced) (short presentations)  
10:30 AM–12:30 PM Breakout sessions (45-minute or 1.5-hour sessions)  
12:45 PM–2:30 PM Lunch and keynote address by Olympic gold medallist Hayley Wickenheiser





bring the science of glycomics into the classroom. The resources are created by experienced science teachers, who work with the scientists in the labs and then use their experiences to create engaging and ready-to-use resources for Canadian classrooms. Last summer, teachers worked in glycomics labs at the University of British Columbia, the University of Guelph and McMaster University. This summer, teachers will be working with researchers at the University of Alberta and Laval University.

All the curriculum resources are available for free on the CMASTE website ([www.cmaste.ualberta.ca](http://www.cmaste.ualberta.ca)) under Teacher Resources. The resources include career connections, labs, STSE (science, technology, society and the environment) issues, webquests and case studies. They cover topics such as the immune system, biofuels, enzymes and antibiotic resistance, which could be used to help students see the relevance of concepts covered in all high school science courses, especially Science 20 and 30, Biology 20 and 30, and Chemistry 30.

Connecting science lessons to current research in Canada may encourage the next generation of world-class scientific researchers to be inspired by the exciting discoveries happening right now in our own backyard.

For more information on glycomics, take a look at the following short videos produced by GlycoNet that outline this fascinating scientific field:

- “The Secret Life of Carbohydrates” ([www.youtube.com/watch?v=sG82Fna4-AQ](http://www.youtube.com/watch?v=sG82Fna4-AQ))
- “Jay Ingram—The Potential of Glycomics” ([www.youtube.com/watch?v=HV6e1QzEnSE](http://www.youtube.com/watch?v=HV6e1QzEnSE))
- “The GlycoNet Story” ([www.youtube.com/watch?v=CQGEGloqTpQ](http://www.youtube.com/watch?v=CQGEGloqTpQ))

For more information about this program, e-mail [cmaste@ualberta.ca](mailto:cmaste@ualberta.ca) (CMASTE) or [snitynsk@ualberta.ca](mailto:snitynsk@ualberta.ca) (GlycoNet).





The website is the labour of love of Andy Brunning, a chemistry teacher in Cambridge, UK. He allows his infographics to be shared online (check out the conditions for doing so at his site), and they are available as PDF downloads so that teachers can print and share the material with

their students. When my own students come to my office or lab and I am busy with others, they always have something to read while they wait, as I post numerous articles, including Brunning's This Week in Chemistry feature.

# THE CHEMISTRY OF CANDY

## Crystalline Candy



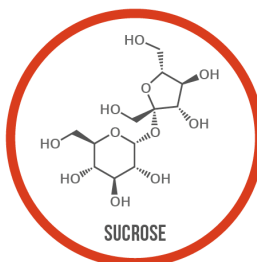
FUDGE



NOUGAT



FONDANT



## Non-crystalline Candy



LOLLIPOPS



CANDY CANES

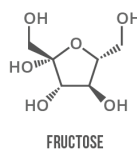
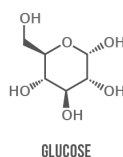


CARAMEL

- LOWER SUGAR CONCENTRATION THAN NON-CRYSTALLINE
- SUCROSE SOLUTION BOILED AT LOWER TEMPERATURE
- CONTAIN MANY SMALL, FINE CRYSTALS OF SUCROSE

Generally smooth & creamy. Crystalline candies contain crystals of sucrose in their finished form; the sucrose molecules are able to align and form large lattices. They are best formed by slow cooling of a sugar solution, without stirring, which can disrupt crystal formation.

## Interfering Agents



- HIGHER SUGAR CONCENTRATION THAN CRYSTALLINE
- SUCROSE SOLUTION BOILED AT HIGHER TEMPERATURE
- FROM VERY SATURATED SOLUTION - NO CRYSTALS

Generally hard & brittle. Non-crystalline, or amorphous candies, form when crystallisation is prevented. This can be accomplished by the addition of sugars such as glucose and fructose that interfere with the development of crystals. Often, their mixtures are too viscous for crystals to form.



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Courtesy of Compound Interest, [www.compoundchem.com/2014/10/21/chemistryofcandy/](http://www.compoundchem.com/2014/10/21/chemistryofcandy/)

The site includes an Infographics Index for searching for materials by topic (such as Food Chemistry, Organic Chemistry, Everyday Compounds and Undeserved Reputations). Similarly, the Archives tab takes you to the long list of posts Brunning has created (in chronological order). What a wonderful way to learn more about the chemistry in the world around us—and a calculator is not required!

If you enjoy the material presented online, Brunning has also published the book *Why Does Asparagus Make Your Wee Smell? And 57 Other Curious Food and Drink Questions* (Orion, 2015). This sounds like a wonderful read over the summer vacation, without the need for a Wi-Fi connection. But for your chemistry classes and science students of all ages, check out the website. You will definitely find something to share.

Brad J Pavelich  
Medicine Hat College



# THE CHEMISTRY OF SUNSCREEN

Summer sun brings with it the risk of sunburn, so we'll all be slapping on the sunscreen to guard against it. But what are the chemicals that keep you from turning as red as a lobster? This graphic looks at them and how they work.



## TYPES OF UV RADIATION

### UVA <sup>wavelength</sup> 320-400nm

Accounts for 95% of solar UV radiation reaching Earth's surface. Penetrates deepest into skin, and contributes to skin cancer via indirect DNA damage.

### UVB <sup>wavelength</sup> 290-320nm

Accounts for 5% of solar UV radiation reaching Earth's surface. Causes direct DNA damage, and is one of the main contributors to skin cancer.

### UVC <sup>wavelength</sup> 290-100nm

Filtered out by ozone in the Earth's atmosphere, and as a result does not reach the surface of the Earth, and doesn't cause skin damage.

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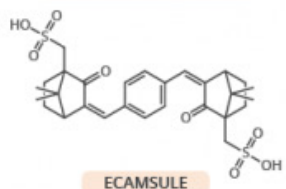
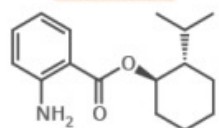
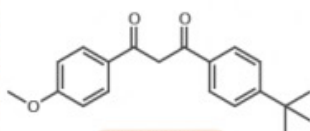
SUNSCREEN ACTIVE  
INGREDIENTS  
APPROVED  
IN THE USA

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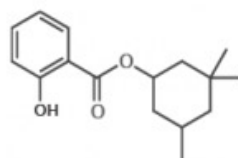
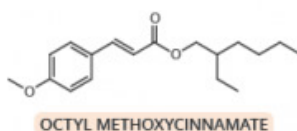
SUNSCREEN ACTIVE  
INGREDIENTS  
APPROVED  
IN THE EU

Inorganic chemicals in sunscreen, such as **zinc oxide** and **titanium oxide**, both absorb and scatter UV light. **Organic chemicals** are also used – the chemical bonds in these absorb UV radiation, with the chemical structure affecting whether they absorb UVA, UVB, or both. Several different chemicals are used in sunscreen to ensure full protection.

## UVA BLOCKERS



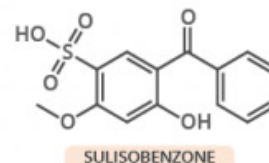
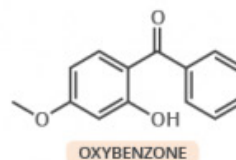
## UVB BLOCKERS



### OTHER UVB BLOCKERS (Italicised = not approved in USA)

PABA	Octylacrylene
Padimate O	Ensilizole
Cinoxate	Octyl triazone
Octyl salicylate	Enzacamene
Trolamine salicylate	Amiloxate

## UVA & UVB BLOCKERS



### OTHER UVA & UVB BLOCKERS (Italicised = not approved in USA)

Dioxybenzone	<i>Neo Heliopan AP</i>
<i>Mexoryl XL</i>	<i>Uvinul A Plus</i>
<i>Tinosorb S</i>	<i>UVA-sorb HEB</i>
<i>Tinosorb M</i>	

All currently approved in EU, Canada & Australia



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Courtesy of Compound Interest, [www.compoundchem.com/2014/06/05/sunscreenchemicals/](http://www.compoundchem.com/2014/06/05/sunscreenchemicals/)

# Learning Together

I have the same conversation with my colleagues every year.

“What classes do you have this semester, Jenna?”

“Science 14, Science 24, . . .”

Sharp intake of breath.

“Oh. Sorry to hear that.”

And then I find myself defending my timetable.

“It’s great. I have a lot of fun.”

But the look of pity on their faces tells me I am not going to sway their opinion.

“Hopefully, you get something better next year.”

By this point in the conversation, my contemporaries have shuffled away, like teaching Science 14/24 is contagious. They don’t even get to hear my reply.

“I hope my schedule is the same next year!”

For those of you unfamiliar with Science 14/24, these are the least academic of the science courses required for a high school diploma in Alberta. They are general science courses (Grades 10 and 11) that cover the basics of chemistry, physics and biology. When I explain the courses to my mother, I jokingly say, “Science 14—I teach them to not drink bleach or ammonia. Science 24—I teach them to not mix bleach and ammonia.”

Sometimes, we have preconceived notions of the students that populate a Science 14/24 classroom: “low achievers,” “coded kids,” “knuckleheads,” “excuse-makers,” “unmotivated drifters.” These (false) assumptions are often also established in my students’ minds: “Mrs Lin, this is the dumb class” is something else I hear every year. When my students say this, it makes me angrier than seeing a student using a cellphone during an exam.

My Science 14/24 students are brilliant. They know so much more than I do about cars, cheerleading, history, welding, cosmetology, acting, football and commercial foods. Their knowledge is limitless for those things they are interested in. Sure, they could be better at science, but they are not dumb. Lucky for them, I am awesome at science, so we can teach each other and learn together.

The curriculum for Science 14/24 is often very general, and not terribly time-consuming. This leaves time to explore their interests—the vehicle

safety unit in Science 24 is the coolest! It also gives me time to explore my interests—a luxury I do not have in the more academically intensive courses I teach. While my 30-level colleagues are pulling their hair out because they are not quite sure how they will fit it all in, I am taking my students on a campus tree tour: identification, specimen collection and then a little time spent in the microscope lab. An entire glorious day of learning (mostly) just for fun, and I am still ahead of schedule.

Some days are more challenging than others, but I can honestly say that my most memorable classes, the best stories I tell at the dinner table, my favourite students, are all from those Science 14/24 classes. These courses allow time for me to make meaningful relationships, with kids who are often surprised that a “core” teacher actually cares about them and enjoys teaching them. Success is rampant when everyone is engaged. High-five! Finally figuring out that blood type O is the universal donor? You’re awesome!

To my junior high colleagues: next time you are registering your students for high school, tell them not to cringe if they “have to take Science 14.” Tell them that you are envious because it is probably the most fun they will ever have in science. As well, to my high school colleagues, if you have an opportunity to teach Science 14/24, jump at it! I promise you, it will be some of the best teaching and learning you have ever done.

We all know that those kids in Chem/Physics/Bio 30 are going to be all right after high school, and they will thank you when they become doctors, engineers and astronauts. I hope you, too, one day get to experience the joy of hearing one of your science kids come up to you at graduation and say, “Hey, teach. I know to not mix bleach and ammonia because of you.”

*Jenna Lin*

*Salisbury Composite High School, Sherwood Park*

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*The Alberta Science Teacher* is one of the official publications of the Science Council (SC) of the Alberta Teachers' Association. SC Bylaw 9.4 states: *The Alberta Science Teacher* shall reflect on the contributions and activities of Alberta science teachers in the classroom.

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# The Science of Success: Reaching Potential



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**Hayley  
Wickenheiser**

4x Olympic Gold Medallist  
Motivational Speaker

 @ATASciCouncil



**Dr. Maria Sirois**

Positive Psychologist  
Author

## Program Highlights:

- New format featuring IDEA talks and workshops
- Friday evening social with banquet, awards,  
and live music
- Organized activities including yoga, volleyball  
tournament, nighttime astronomy, and more!

