

American Chemical Society AMA: I'm Marty Mulvihill, from the University of California, Berkeley and Safer Made. Ask me anything about chemistry in our products and safer chemical design AMA.

AmerChemSocietyAMA<sup>1</sup> and r/Science AMAs<sup>1</sup>

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So many things tell me aspartame (and all the other fake sugars) is bad for me, can you explain (in simple terms for me) if that is true and how it is bad?

[redbootz](#)

I have struggled with this question. There is a lot of information out there on the side effects of some artificial sweeteners, aspartame and sucralose in particular. But we also know that large quantities of sugar are bad, especially if you are at risk for diabetes. My biggest issue with the artificial sweeteners is that they are usually found in highly processed snack foods which aren't particularly healthy anyway.

Is everything labeled as "recognized by the state of California to cause birth defects and cancer" going to kill me or is it just a precaution?

[Shmei](#)

That label is the public facing part of Prop 65. Proposition 65 is a running list of chemicals that have been linked to cancer or reproductive harm. Unfortunately, the labels don't often tell you what chemical is causing the probably and therefore it is hard to make informed choices to avoid the chemical/product of concern.

In apartments it is usually lead paint or asbestos, in gas stations it is benzene and other constituents in fuel. They are currently popping up in stores because of BPA in cans (more on that later).

These labels may encourage you to dig deeper, but they always refer to a chronic or long term risk, rather than an acute danger.

As a side note, the threat of Prop 65 labeling has been an effective tool for forcing certain chemicals out of consumer products.

The U.S. Chemical Safety and Hazard Investigation Board has an amazing series of videos on

chemical handling disasters (available on YouTube). In your opinion what accident did we learn the most from? Additionally what interactions does the American Chemical Society have with the U.S CSB?

[bostwickinator](#)

I think that the Elk River chemical spill when crude 4-methylcyclohexanemethanol (MCHM), was a big deal for folks recognizing how little information we have/keep about the impacts of industrial chemicals on human health and the water supply.

What role do you think this "chemophobia" plays in the Chem. Business? Do you think companies spend more R&D time and money making products safer or making new products?

[McFiend](#)

Consumer facing brands and businesses are investing in safer chemistries and formulation because of consumer demand.

Chemical suppliers are slower to act because they feel less direct pressure, and they have large capital investments that make large changes both challenging and potentially very costly.

Change will come from small players with more flexibility.

How will you motivate labs to use these safer chemicals if they can use more toxic ones that are cheaper and more effective?

[al23](#)

Labs will transition when: 1) Costs for managing the more harmful substances are too high. 2) When employees or researchers demand it for personal reasons. 3) When the lab recognizes that there is an opportunity to do interesting and fundable new science.

The switch in undergraduate teaching labs is already occurring because all three of these conditions are met in that environment.

Large pharma research labs are already change because it lowers cost and speeds the scale-up process.

Research labs will change more slowly and it will always be easier to change when it aligns with other research goals.

Thank you for your time in answering some of these questions, this is an area of knowledge that's hard to cut through the marketing hype of major producers of these types of products claiming "safer" chemicals. My question is regarding the use of silver (threading) in wipe cloths as a viable alternative to a using a harsher chemical solution. My girlfriend recently bought from a company these microfiber cloths and she insists that you only need water to disinfect surfaces with it. I know that historically (I.e. Use of real silverware by nobility helping to avoid the plague, knowingly or not) silver has been proven to boost resistances, but should it replace chemical products as a safer environmental cleaner? I've argued that there's no way the very small amount of silver in these cloths could disinfect surfaces as the company claims, but would rather hear from a professional on the capabilities of silver as a cleaning product. Any info would be greatly appreciated so as I don't spend a mint continuing to buy these things if they are ineffective. Thanks!

[wavform](#)

Silver is one of the commonly used antimicrobial additives in a wide range of consumer products. Silver metal is bacteriostatic, meaning that bacteria will not grow on the surface. Silver ions are antimicrobial, meaning they will actually kill some bacteria. Silver naturally tarnishes, ie. oxidizes, which will release a small amount of silver ion. I don't know if it is enough to disinfect on its own, but the clothes themselves will very likely resist bacterial growth. You will have to be the judge of their effectiveness in cleaning in your own home.

How are we helping industry chemists, pressed to innovate for business, develop safely and economically? Such as - how are we streamlining the regulatory environment so that things like Pre-Manufacture Notices and TSCA inclusion don't take 10 years? (to the point that they are no longer worthwhile to pursue)

[RockerSci](#)

As you may have already heard, the congress recently passed the first update to TSCA in 40 years this summer. While it is still an imperfect tool, at least all chemicals in commerce will now be treated more equally. In the past there has been an implicit bias against new chemicals because of the additional regulatory barrier. Now all chemicals will have to meet the same requirements. It may not be as streamlined as some want, but at least it isn't biased against new chemistry.

What are you and your organization's stances on the mandatory labeling of genetically-modified organisms (GMOs)? Is there any evidence of an actual risk for consumers that warrants labels? I think there are a lot of people that view GMOs in a similar manner as potentially hazardous chemicals.

There seems to be a lot of misinformation surrounding both the chemical and GMO industries. Does a lack of basic chemistry and biology knowledge contribute to this problem? What needs to be done to better educate the general public about the differences between safe and hazardous chemicals?

[shiruken](#)

The chemical and the GMO issue both suffer from over simplification. Chemists and folks in synthetic biology need to recognize that there are better and worse practices and products in our respective industries and that we should speak out about both the hazards and the benefits. All too often we dismiss all concerns which doesn't build trust with the public. More education is always helpful, and creating curriculum and conversations around these topics is good for everyone.

I work for a company that focuses on EH&S and regulations, and while my position is not focused on those details I find it interesting. Are you up to date on general regulations of chemicals across the world? Are there certain countries or regions that you find do too much regulating, or others that do not do enough?

[weird\\_al\\_yankee](#)

My personal opinion is that regulation is the best tool for requiring common standards of transparency, and thresholds for health performance. Regulation is too inflexible to respond on a chemical by chemical basis to new information. This is my opinion and REACH in the EU takes steps in this direction, but it is still far from perfect.

Hello again Marty! Long time fan first time reddit commentor

How do you think the role of life cycle assessment will guide sustainable design? How can we incorporate this into under/graduate coursework, and even as a component of research in green journals?

[julianfri](#)

LCA is a great tool for identifying inefficiencies in the current manufacturing systems, or in capturing the environmental effects of chemical processes. Philip Jessop has the best curriculum that I have seen for chemists. Here is a link to one of his ChemEd articles: <http://pubs.acs.org/doi/abs/10.1021/ed200249v>. We also need better tools for hazard assessment for individual ingredients or chemicals which complement the existing LCA tools.

Hey! Not a chemistry question, but where's your favorite place to go out to eat in Berkeley?

[bombsaway1979](#)

These days I grab a veggie naan wrap at Urban Turban on the Northside of campus.

Hi, I'm currently a senior in high school and am going to start applying for colleges soon, do you have any suggestions on classes I should take to get into the chemistry field, jobs like chemical engineering?

[voutinator](#)

Yeah science! Chemistry is great because it is a useful prerequisite for so many fields of science and engineering. My advice is to seek out research and project-based learning opportunities early in your college career. Also don't discount the importance of learning valuable communication and skills outside of traditional STEM courses.

Hey Marty! I'm an undergraduate at the University of Denver working on photo-organic synthesis! I'm excited by the prospect of making molecules using light and less harmful reactants. What interesting/useful career options are there for photochemistry? Do you think there is much potential for this kind of science?

[jasz32](#)

There are useful careers related to every type of chemistry, as long as you are willing to apply your knowledge to diverse problems. Photochemistry, like Green Chemistry is a tool/approach, that could be useful in many areas, but it will not always be the best option.

Bees pollinate a huge number of different plants but are increasingly under attack by pesticides. How is the scientific community working to save the planet's bee population?

[madam1](#)

We know that pollinator populations including bees are suffering (<http://www.nytimes.com/2016/02/27/science/decline-of-species-that-pollinate-poses-a-threat-to-global-food-supply-report-warns.html>). There are many factors contributing to the decline in bee populations, and it is hard to isolate a single cause. We do know that stresses on the population including pesticide

use (neonicotinoids in particular), climate change, mites and other pathogens, and land use changes all harm the health of pollinators and scientists are working to address all of these root causes. Let's just hope they are working fast enough!

In a world where regulations concerning what we wear, eat and generally come into contact with, are far too loose (may not feel that way to you), how far does your company actually go to find out how safe something is? As another gauge, how safe do you feel bpa free plastic is?

#### [DieSchadenfreude](#)

Our approach is to invest in companies that eliminate the use of harmful chemicals. We define harmful chemicals as those that have been identified by regulatory or scientific bodies as harmful. So BPA which is now regulated in the EU and CA, so we are actively looking for food contact packaging that doesn't use BPA, phthalates, or other harmful chemicals. We avoid regrettable substitution by focusing on new classes of chemicals and manufacturing/product design that uses the safest alternatives that are available.

When a chemical or group of chemicals in widespread use come under suspicion of harming human health (or the environment), what is your opinion on how we debate and decide on whether to phase out or continue to use such chemicals? Are we properly evaluating the alternatives?

For example, in some places there is a push to ban parabens from cosmetics, but there doesn't seem to be much focus on what manufacturers will use instead, or indeed whether they won't use anything and we'll end up with fungal infections because the cosmetics go bad.

#### [CrateDane](#)

I believe that addressing the issue of harmful or harsh chemicals in our consumer products is a continuous process that should focus on improvement rather than a fixed standard. Parabens and formaldehyde releasing agents have largely been replaced by MIT/CMIT, phenoxy ethanol, and other preservatives. We will always need more and safer preservatives. Like antibiotics we will all be safer if there are many to choose from. We will also be safer if they are designed to avoid interaction with human biological systems. There is an opportunity to be developing new preservatives. I put this challenge out to all of the med/organic chemists out there! Safer Made will invest in these solutions.

Dear Dr Mulvihill, I am a chemistry undergraduate student aspiring to have a career in sustainable chemistry. I am really impressed and inspired by what you are doing and I think it is vital to inform the general public and companies about the chemicals they are dealing with. As chemists it is our role to investigate greener solutions for chemicals and products, but these will only benefit if they are put into practice or are competitive on the market, which is not up to us. Who do you think plays the major role in communicating to the public?

I would love to get involved in the type of research you are doing, and I was wondering if you offer any opportunities such as summer placements at Berkeley Center for Green Chemistry.

#### [glorii96](#)

We are all responsible for doing a better job communicating not only with the public, but also with other scientists, engineers, and designers who actually end up choosing the chemicals that end up in products. People crave thought partners for designing safer materials and products, because they are currently faced with a bunch of 'bad' chemicals and they don't know how to identify 'good' ones. Many

of our students go on to work in consumer facing companies to play that translation role, and help bridge the gap between the traditional chemical suppliers and researchers and the consumer product manufacturers. I would recommend the ACS Green Chemistry Summer School (<https://www.acs.org/content/acs/en/greenchemistry/students-educators/summerschool.html>) and reaching out to faculty associated with Green Chemistry Centers around the US.