American Chemical Society AMA: We're Kevin Wepasnick, scientist and project manager at Anderson Materials Evaluation, and Craig Bettenhausen, associate editor at C&EN. We made helium beer. Ask us anyth

AmerChemSocietyAMA [1] and r/Science AMAs[1]

[1]Affiliation not available

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Abstract

Hi Reddit! Kevin is a surface scientist with a Ph.D. in chemistry from Johns Hopkins and an expert beer homebrewer. Craig is a science writer and editor for Chemical & Engineering News with a background in inorganic chemistry who brews kombucha and hard cider. After seeing some fake helium beer videos online, Kevin and Craig got into a discussion about whether it would be possible to do it for real. Their calculations suggested it was feasible, so they gave it a shot. You can read about the results, and get the recipe, at http://cenm.ag/heliumbeer We'll be back at 12pm ET to answer your questions! Edit - We are here to answer your questions! KW & CB Edit - We are wrapping up. Thanks for all the good questions. We might be back on later to answer more. -KW & CB

the WINNOWER

REDDIT

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AMERCHEMSOCIETYAMA R/SCIENCE

Hi Reddit!
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Aw it is too bad (though perhaps expected) that your helium beer didn't produce any fun pitch changes. Do you have any other science hacked alcohol recipes you're planning to try in the future? I'd love to see a series of science experimenting with food - like a Mythbusters meets Food Network.

firedrops

We were a little disappointed, but at the same time, the science behind it did not support a positive outcome. We actually tried several ways to get more helium into the headspace of the glass and inhaling deeply with each drink. That only served to make me dizzy and still no pitch change.

We presently have no plans for future hacks, but we are certainly open to suggestions!

Happy Cakeday! -KW

Hi guys, thanks for the AMA!
Have you been tempted to try any other novel experiments to your brewing, either in the process or ingredients?
Also, how much background knowledge in chemistry do you think would make a difference to new homebrewers getting it right from early on?

And cheekily, what's your favourite beer just now? :)

StonedPhysicist

My favorite beer right now is Blackwing from Baltimore's Union Craft brew. It's a black lager, really nice balance of hops and malt. I join the crowd and find myself leaning toward dark beers in winter and IPAs in summer. http://www.unioncraftbrewing.com/project/blackwing-lager/

I've had chemistry-fueled success recently in my hard cider brewing. I was getting a lot of sulfur taste/smell, which comes from H2S. I knew from my chemistry training that copper metal would strip out H2S, so I bought a pack of Choir Boy copper wool, sanitized that, and ran the cider over it when racking/bottling. It worked like a charm.

My chemistry lab background has helped my brewing by a) getting me to keep good records of what I do and what the results and b) getting me used to failing without getting too discouraged. :) --CB

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StonedPhysicist

I am alway interested in trying something new. Trying new fermentables and botanical flavorings are some of my favorites.

As for background knowledge, I did not feel that it make a significant difference in the process. Other homebrewing friends of mine come from different disciplines (e.g., IT, Culinary Arts, Music, Education, Biology, Engineering, etc.) and we have all been successful in brewing beer. The two key skills for being a successful homebrewer are a) being able to follow a procedure/recipie and b) being mindful of sanitation and clean working conditions.

A chemistry background allows me to appreciate the chemical reactions occurring, but I don't think that it has enhanced my ability to brew.

Presently, my favorite beer is an oatmeal stout. -KW

Hi guys, great story! How did the cost of this batch compare to a traditional brew?

superhelical

We rented a small helium cylinder from Robert's Oxygen. It cost about $70 bucks. We ended up keeping it for 3 months so we could shoot the video, so that added another $30.

Other than that, the cost was just the same as a normal 5 gal (19 L) homebrew batch. --CB

Obviously you are aware of the trends in beer. Session beers, sours, farmhouse ales, barrel aged, etc etc have been the latest, but... Where do you see the next trends in beer, and how do you see science playing a role?

geauxjeaux

I think we're also going to see more non-beer brewed booze. Things like mead, cider, and beverages from other cultures. Sake has a lot of flavor territory that's mostly unexplored in the Western market, for

example. --CB

Obviously you are aware of the trends in beer. Session beers, sours, farmhouse ales, barrel aged, etc etc have been the latest, but... Where do you see the next trends in beer, and how do you see science playing a role?

geauxjeaux

Next week in C&EN, I have a story about contract analytical services firms that have sprung up to serve the craft beer boom. One advantage a third-party lab has is that they get samples from lots of different breweries.

They both said we're going to see an increase in barrel-aged beers, sour beers, and weird beers. The latter includes things with acetic acid bacteria and other microbes that would have formerly been considered spoilage microbes, but now are being added on purpose.

The big role science is going to play is in quality control and analysis. I'm sure some clever chemistry tricks are going to be discovered, but I think more and more brewers are going to take advantage of inexpensive chemical analysis to improve their product. It's getting competitive, it's not enough to throw in a ton of hops and call it a MegaIPA anymore. --CB

As a scientific professional, do you believe helium is a finite resource? If so, how can you justify its use in such a trivial manner?

Edit: after re-reading my question, I realize it comes off as much harsher than I realized. I would just like to know how people in the scientific comunity feel about the use of helium in experimentation.

mikemeade136

Helium is absolutely a finite resource, on Earth, and should be conserved. It sounds kinda funny to say of gas, but helium is mined. It's produced by radioactive decay of heavier elements. In some rock formations, it'll build up in pockets. But as soon as its free, it floats up past the upper layers of the atmosphere and out into space.

There are only so many of those helium-accumulating radioactive rock formations on Earth, and many of them are in politically unstable regions.

We need helium to cool superconducting magnets for medical instruments and high-power analytical instruments (NMR, EPR). It gets down to −269 °C, or 4 K. I actually think research into high-temperature superconducting materials is the most important field of research happening right now. If we could get superconductivity to happen at a reasonable cost even at liquid nitrogen temperatures, it'd allow our current generation of technology to be sustainable and enable a whole new generation of technologies.

But until then, we need to be careful not to waste helium. More than a few chemists boycott the Macy's Thanksgiving Day Parade. Now THAT is a lot of helium.

I can nearly guarantee you that we used less helium pressurizing this beer than the people faking it used to shoot their April Fools videos. --CB

Does this accomplishment pave the way for any new applications for using helium? I'm curious because as I understand it, Helium is a non-renewable resource with important industrial/medical

applications so I'd hate to see it's depletion rate increase due to a potential fad if "heliumnating" were to somehow catch on among the increasing number of microbreweries today.

funknjam

I'm seeing a LOT more nitrobrews popping up in taprooms and even in cans. I would hope anyone tempted to make helium beer on a production scale would just read our article and say, "nah, let's do a nitrobrew instead." --CB

So first off I love beer, so thanks for your creation. I have never sampled helium beer but would be happy to do so! What are the main differences between it and a regular beer? (I guess mainly I am asking about flavor wise, I assume it changes your voice as well?)

OverlyAverageJoe

No significant differences in flavor or texture were found compared to nitrogen-based beers. We did a side-by-side comparison with Guinness, a classic example of a Nitro beer, and the fizzinesses were comparable. Compared to a standard CO2 beer, the beer was a bit flat but the flavor was smoother and less acidic. -KW

Were there any side effects to trying the first few batches of beer? I.E. Willy Wonka floating scene.

TxRumm

It made changing the lightbulbs a snap! Just kidding...

No, nothing out of the ordinary. We tried pretty hard to get an effect, but at the end of the day, "this myth is busted!" -KW

[deleted]

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You're welcome! Thanks for participating! The goal here was to experimentally evaluate the possibility of a helium based beer in order to see if the April Fools videos some breweries like Sam Adams, Berkshire, and Stone put out with regard to helium beer have any basis in reality.

No significant differences in flavor or texture were found compared to nitrogen-based beers. -KW

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[deleted]

Interestingly, it got flatter and flatter the more times we tapped it. In thinking about that and reading some online discussion, including at r/chemistry, we came up with a theory:

After it was put in the keg, it would still have had some fermentation going on, producing some CO2. So the first time we tapped it, it was probably pressurized with a mix of biological CO2 and the helium we added. But each time we poured and re-pressurized, we stripped out more and more of that CO2. Which would explain why the photo in the article has a good head straight out of the tap but in the video (two weeks and two tappings later), we had to fluff it by bubbling helium directly into the glass.

In the lab, if you want to degas a liquid (aka remove oxygen and CO2), one of the ways to do that is to bubble argon or another inert gas through it for a while. We think we basically did that same thing by tapping and repressurizeing over and over. --CB

How did it taste compared to normal beer?

Rockonfoo

Depends on what you consider a "normal beer." We brewed a coffee cream stout, which is already significantly different than your average beer. I think it was comparable to other coffee cream stouts. . We did a side-by-side comparison with Guinness, a classic example of a Nitro beer, and the fizzinesses and textures were comparable. Compared to a standard CO2 beer, the beer was a bit flat but the flavor was smoother and less acidic. -KW

For anyone not wanting to click all the way to their website, here's a YouTube video explaining how helium was used in the process and the results.

How did helium-ating(?) affect the texture and taste of the beer compared to normal carbonation? Could any other noble gases with higher solubility in water be worth trying?

shiruken

We answered a similar question below. I think the noble gases all have similar low solubility. --CB

How feasible do you see this process for a local craft brewery, one that has already invested a very large amount into the process. Would you recommend at least trying it, or just notch it up as a novelty?

Archteryx

I cannot emphasize enough that doing this on a production scale is a terrible idea :)

The salesmen at Robert's Oxygen, where I got the helium tank, made me promise I had no intentions of making helium beer on a regular basis. --CB

Nitrogen works and helium was a bust. Do you have any guesses on the feasibility (health, money, and physics-wise) of other gases to "carbonate" beer?

geauxjeaux

At least one person has done argon, with similar results (https://www.youtube.com/watch?v=5v91dLMphls). We thought about sulfur hexafluoride, which is much heavier than air and so makes your voice lower if you inhale it, but we were a little worried about the safety of that. Also we kinda wanted to stick to gases that we had experience handling.

I guess you could use H2S. It's nice and soluble. Of course, it smells bad and tends to swamp out other tastes, so there's that problem. :)

You'd want to find something nontoxic, and something that, if it reacts with water, does so reversibly. And something that has either a good taste/smell or none. Carbon dioxide is ideal, as it turns out. --CB