

Hi Reddit, we're Robert Strongin and Jiries Meehan-Atrash of Portland State University! Ask us anything about analyzing the vapors created in cannabis dabbing, including the possible hazard of terpenes.

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

<sup>1</sup>Affiliation not available

April 17, 2023

### Abstract

ACS AMA Hi Reddit! Robert Strongin and Jiries Meehan-Atrash here from Portland State University. We recently had a paper in ACS Omega entitled "Toxicant Formation in Dabbing: The Terpene Story" (<http://pubs.acs.org/doi/full/10.1021/acsomega.7b01130>). We describe there that "dabbing" means to put a small amount of cannabis-containing liquid such as butane hash oil on a hot surface, then inhale the vapors via a water pipe. This is an example of a noncombustible use of cannabis, i.e. not requiring smoking; Cannabis dabbing has found increased popularity as medicinal and recreational use has increased. Our study concludes "that dabbing, although considered a form of vaporization, may in fact deliver significant amounts of toxic degradation products". In this Ask Us Anything, we look forward to answering your questions about our research on chemical analysis of the vapors produced by cannabis "dabbing" – this could include the instrumentation we used, the chemical nature of terpenes and their degradation products, and toxicological ramifications. Note that we are not medical experts, but chemists conducting analysis. About us: Robert Strongin, Ph.D.: I am a professor in the Portland State University Department of Chemistry and I have affiliate appointments at the Oregon Health and Sciences University. My research focuses broadly on redox and chromophore chemistry. It encompasses the creation of biosensors and molecular probes for studying oxidative stress and cancer, as well as the investigation of chemical reactions and products associated with the usage of electronic cigarettes and new cannabis formulations. I received my B.A. in chemistry from Temple University, then worked as an industrial chemist at FMC Corporation and SmithKline Beechman. I then obtained a Ph.D. in organic chemistry at the University of Pennsylvania. Upon graduation, I began my independent career at Louisiana State University, then later moving to Portland State University. In addition to my academic research, I'm a biotech startup founder, an advocate for science funding, a regular grant review panel chairman at the National Institutes of Health, and dedicate much time to improving STEM education. Jiries Meehan-Atrash: I am a Palestinian-American who attended high school at the Colegio "El Estudio" in Madrid, Spain. I then received a B.S. in chemistry at State University of New York at New Paltz, where I also did research in organic chemistry. After working in New York City as a freelance Spanish-English technical translator for two years, I enrolled in the chemistry graduate program at Portland State University. I've been working on the cannabis vaporizer toxicology project since its inception in January 2017 in Dr. Strongin's lab. We'll be back at 1pm EDT (10am PDT, 5pm UTC) to start answering your questions. We're online now, taking your questions -acs signed off -acs

[REDDIT](#)

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AMERCHEMSOCIETYAMA [R/SCIENCE](#)

### [ACS AMA](#)

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CORRESPONDENCE:

What method would be the most effective to extract the beneficial chemical products from Marijuana?  
Is there a safe way to do this in a typical home?

[Captain\\_Stairs](#)

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We havent studied extraction processes, but this is definitely planned soon. So I dont have a great answer - sorry. I dont think this is genrally a good idea to do in a typical home -RS

What contaminants are you finding in the samples? How much / how often benzene?

Any signs of mold or bacteria from live resin samples or non-chemical extractions?

[SirSpaceALot](#)

We did not analyze samples of cannabis extracts. We only studied pure terpenes -jma

1) Are there safer extraction methods to produce concentrates than those done with butane?

2) I have used concentrates as a base to make effective edibles. Does consumption of a concentrate dissolved in an edible medium deliver the same level of toxicity, or is the combustion and inhalation the primary cause of concern?

[Ivedefinitelyreddit](#)

We only analyzed pure terpenes. Supercritical CO2 extraction does not use a flammable solvent and does not leave behind residual solvent.

Combustion is the primary mode of the formation of degradants, but we have not studied degradation at the temperatures seen in an oven.

-jma

Can you list the safest ways to consume cannabis and the ways best avoided?

[LD\\_in\\_MT](#)

We don't promote the consumption of cannabis and cannot give recommendations to it -jma

\*Would an overheated nail or an improper extraction have more of an effect on the amount of "toxic degradation products?"

\*Do different extraction methods result in different cannabinoid profiles? (Ex. Dry sift, water hash, butane, CO2, isopropyl, grain alcohol? Differences in final product caused by physical vs solvent vs other solvents?)

\*Can the profiles be changed or improved after initial processing in any way, such as whipping the oil?

\*Is water extraction the best way to produce a high quality, clean hash, due to having multiple grades extract based on the micron sizes of your water extraction setup, or would a brief solvent run be better?

I'll take any answers or insights you can provide, thanks for doing this AMA I'm glad I caught it in time! It's hard to believe how far we've come in the past 10 years in this field.

[wtfawdNoWeddingShoes](#)

Since we only studied pure terpenes, temperature was the only variable we got to consider. Residual

solvent left in the extract would likely degrade to form its own slew of toxic products.

We have not studied extraction and cannot make any recommendations about it.

First, thank you for your proper usage of EDT for the time zone.

I am a cannabis user who switched completely to vape cartridges that fit on a small 510 threaded battery. Picture - <https://www.instagram.com/p/Ba3d7iGIBOM/>

I never felt dabbing was much better than smoking normal flower and fell in love with this version of vaping. Have you done any research on this particular method of ingestion?

[dasoomer](#)

Not directly, but more having temperature control and keeping temps lower is helpful, regardless of method of use. Overall vape cartridges in principle should heat at lower temperatures, for example, than a creme brulee torch and nail during dabbing-RS

Hello! Thank you for doing this AMA, interesting topic, I must say!

Two questions if I may: 1) Could you expand on the toxicity of the chemicals you're finding, particularly at typical dosages

2) Are the chemicals you're researching more or less present in other forms of non-combustible methods such as heating product by convection rather than directly placing them on a hot surface?

Thank you!

[StonedPhysicist](#)

Thank you! At the typical temperatures used in dabbing, 50 - 100 ng of methacrolein is generated per dab (see Figure 1 in the study). The amount increases drastically with the temperature.

Methacrolein is a noxious irritant but it is very understudied in its toxicology.

We will continue to investigate other methods of consumption as our research progresses.

-jma