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A Total Synthesis of Tesseractane: The First Preparation of a 4-Dimensional Natural Product

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Abstract: If you thought cubane was weird, this will blow your tiny mind.

Recent studies have shown that incorporating more 3-dimensionality into molecules tends to result in better medicinal properties, so we envisaged that incorporating some 4-dimensionality would further improve drug molecules. As a proof-of-concept, we set out to synthesize tesseractane, a natural product that was isolated from 4-dimensional fungi on the planet Zorpelgorp. This molecule is the 4-dimensional analogue of cubane, which itself is the 3-dimensional analogue of "squarane" (Figure 1).

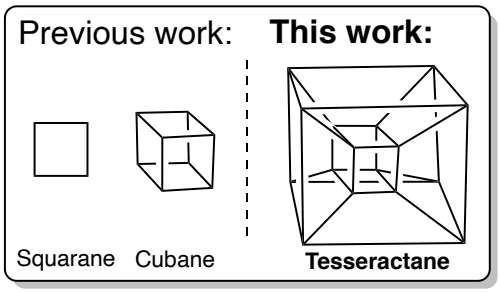
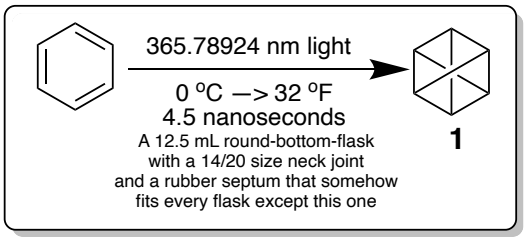


Figure 1: Previous work in the field of pointless molecules.

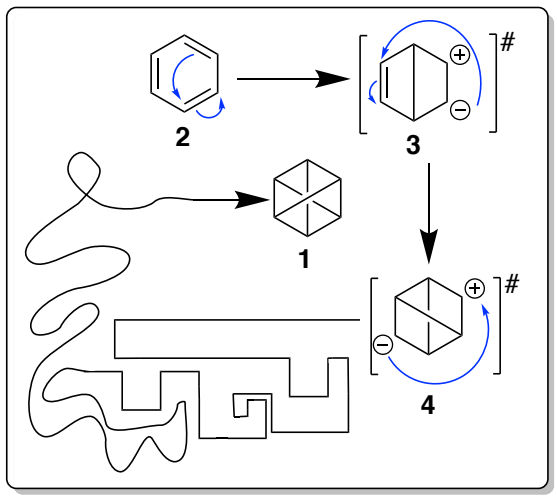
The key challenge to synthesizing tesseractane was figuring out how to form carbon-carbon bonds in 4-dimensional space. To do this, we consulted a mathematician who, in exchange for a bottle of our finest scotch, gave us a method to form carbon-carbon bonds in one-dimensional space. We hope that this method generalizes to all higher dimensions.

Armed with a strategy and three energetic first-year graduate students who haven't been here long enough to have the life completely drained out of them, we began the synthesis by performing the well-known isomerization reaction shown in Scheme 1, in which 1,2,3,4,5,6-hexadehydrocyclohexane, (also known as "benzene"), is converted to whatever the fuck **1** is.



Scheme 1: Isomerisation of 1,2,3,4,5,6-hexadehydrocyclohexane.

The mechanism for this transformation is illustrated in Pyramid Scheme 2. Benzene (**2**) proceeds through one intermediate (**3**) and one beginner (**4**) to yield advanced product **1**.



Pyramid Scheme 2: Mechanism of isomerisation.

While this reaction was progressing, we got bored and decided to do DFT studies on tesseractane's equilibrium conformation because why not. We initially elected to use an *ab initio* method, but this was quickly abandoned as no one in our lab has any computational experience and we don't want to ask the physical chemists for help cuz they're always mean to us in the hallways and they always take all the everything bagels from the cafeteria first thing in the morning so there's none left for us like really guys can you not just leave like literally TWO FUCKING BAGELS for the rest of us ok thx bye. Thus, we decided to use Hardtree Fucks (or something like that idrk) with the 6-311+G** basis set. However, we could tell this would take too long since we went out for beers at 10 am and when we came back an hour later it still wasn't done, so we tried 6-311+G*, 6-311G*, and 3-21G before finally arriving at T-Mobile 4G LTE and that did the trick.[‡] The computational results were very interesting, but none of us knew what file format to save the results in so they are not included in the present publication. These might be published in a future article, or maybe they won't, who knows. This shit is too hard and we're tired.

We then set out to optimize the yield of this isomerization reaction. As we planned to move this product into 4-dimensional space, we needed a whole lot of it to account for losses in transport through interdimensional tunnelling, quark-electron exchange, triplet radical minimal-energy-crossing-point lactic acid fermentation, and related phenomena. After extensive optimization of the wavelength of light (Scheme 3), we improved the yield from 0.01% to 6.9 * 10420 %.

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‡ *This basis set is not available in Nebraska, but we found that Verizon 5G also works fine.*

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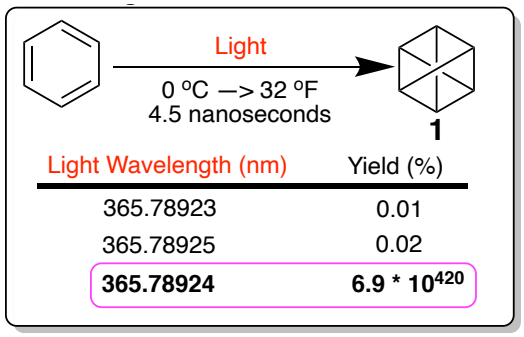
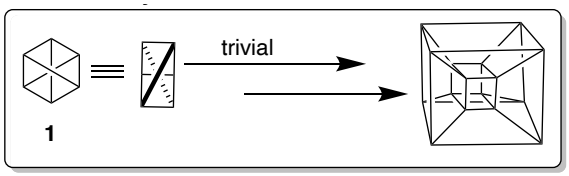


Scheme 3: Wavelength optimisation.

With enough material (400 petagrams) of product **1**, we set out to synthesize tesseractane. If **1** is redrawn in a different conformation (**Scheme 4**) then it can be clearly seen that the transformation of **1** to tesseractane is trivial, and it will be left as an exercise for the reader.



Scheme 2: Wavelength optimisation.

Elucidating the structure of a 4-dimensional molecule seemed extremely challenging, so we didn't do it. Instead, we instead asked our analytical colleagues to do it instead, and they instead invented a new technique known as 3D NMR spectroscopy instead to elucidate the structure instead. According to our chief analytical collaborator, "The challenging thing about doing NMR on 4-dimensional molecules is that the free induction decay of the nuclei is no longer free. It costs about $0.05 per nuclei, which may not seem like a lot, but a one-gram sample of tesseractane has at least a couple hundred nuclei, probably even more, so this adds up quickly."

We also employed electronic absorption spectroscopy, but these spectra are very complex as electrons in 4-dimensional space occupy not only s, p, d, and f orbitals, but also g, k, q, and even w orbitals. To comb through the overwhelming 12,000,000 pages of data (sorry Amazon rainforest), we hired a team of 5 people with experience in both automobile repair and probability theory. This technique is known as a statistical mechanics approach.

The structural elucidation is included in the Unsupportive Misinformation, which can be accessed free of charge at the following link:
https://www.youtube.com/watch?v=dQw4w9WgXcQ.

Author Contributions

# These authors contributed equally to this work.
δ Just kidding, this guy did most of it.
$ This author did jack shit, but he is in charge of funding so we feel like we've got no choice.
* Corresponding author. Please direct all questions to the following email address: pleasedontcontactme@notarealaddress.com

Acknowledgments

We think the analytical chemistry guy's name was George. Or was it Fred??? Anyway, huge thanks to that guy, he really saved our asses.

We were also delighted to have two talented undergraduates join our lab after word got out about our fascinating results. Since the synthesis was all done and they were both pre-med students, we decided to mess with them and made them do a bunch of columns on random shit that we didn't actually care about. Their responses to this were very interesting, and we plan to publish these results in the *Journal of Unethical and Probably Illegal Psychology Experiments*.

Conflicts of Interest

There is nothing interesting, conflict or otherwise, going on in any of the authors' lives at the moment.

References

1. We didn't really do any research before setting up our reactions, but apparently we have to include at least one reference. So we googled "fourth dimension" and found this paper with some smart-looking math stuff: https://link.springer.com/article/10.1007/BF01807638