Turning then to university chemistry practical courses, Sella contends that with perhaps some exceptions we have little to be proud of here with our protocol-based, adventure-free experiments. We even make our students wear pointless little gloves to make sure they do not dirty their hands on the subject. Only in the final year do we let them loose on investigations, complaining then that our new research recruits don't show enough initiative.

Then it is revealed, in question time, that Sella's earlier demonstration reaction was a deliberate failure! He had merely mixed two samples of tap water together. As we left the theatre we asked, why would he do that? Isn't chemistry hard enough?

Yes it is, but it is also more splendid than the sky at night, more complex than Turing's computer and at least as cute as a bunch of meerkats. That dry chemical equation A + B → C + D, says Sella, contains a story we're failing to tell. A+B are the characters, C+D are the credits. No one goes to the movies for that. The story is in the arrow.

Like Sella's experiment, the flashes and bangs through which we tried to sell our subject were destined to fail. We need to tell a deeper, mysterious story of the beauty of chemistry. ❐

The lecture *Is Chemistry Really so Difficult?* can be viewed online at *https://royalsociety.org/events/2015/02/faraday-prize-lecture/*

REVIEWED BY PETER SCOTT

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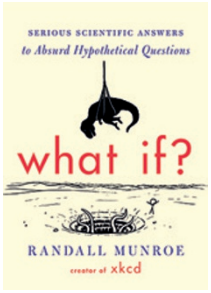
References

1. Kreiβl, F. R. & Krätz, O. *Feuer und Flamme, Schall und Rauch: Schauexperimente und Chemiehistorisches* (Wiley-VCH, 2008).
2. Mason, P. E. *et al. Nature Chem.* **7**, 250–254 (2015).

The science of silliness



What If? Serious Scientific Answers to Absurd Hypothetical Questions

by Randall Munroe

HOUGHTON MIFFLIN HARCOURT; 2014. 320 PP. US$24

Fans of Randall Munroe's xkcd webcomic are probably already familiar with the *What If?* concept, where he answers hypothetical questions submitted through his website with equal parts rigour and humour. The book version brings together some classics from his website along with some brand-new puzzlers.

The questions range from whether you would need to dive to the bottom of a spent-nuclear-fuel pool to experience a fatal dose of radiation (answer: yes; you'd be fine at the surface) to what would happen if an earthquake measuring 15 on the Richter scale hit New York City (answer: things would get messy and not just in the Big Apple; according to Munroe, the Death Star triggered a magnitude 15 earthquake on Alderaan and we know that didn't end well).

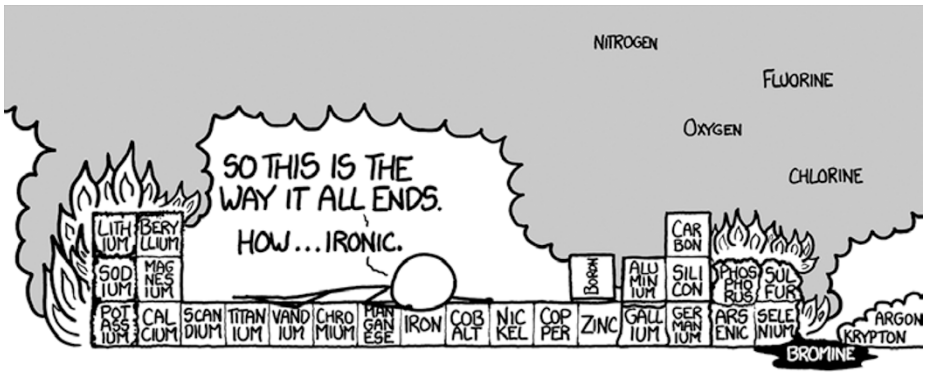
There are a few chemistry-related questions in the book, including one of my all-time favourite 'what if' questions: what would happen if you were to gather a mole (unit of measurement) of moles (the small furry critter) in one place? If we did that here on Earth, the planet's surface would, apparently, end up covered with a layer of moles 80 km deep. As Munroe delicately points out, this "smothering ocean of high-pressure meat" wouldn't be good news for the human race. If we collected a mole of moles in space instead, this would result in a mole planet just a little bit larger than our moon — and its internal dynamics would be fascinating!

The most inherently chemical question in the book considers what would happen if you built a periodic table from cube-shaped bricks, where each brick is made from the element it represents in the table. Munroe works his way through the periodic table row by row, even consulting Derek Lowe (author of the In the Pipeline blog) about the reactivity of fluorine, which is the element where things really start to get dangerous. By the time we get to transuranic bricks, the situation is somewhat apocalyptic.

My one — and pretty much only — quibble is that there are a few simple chemical mistakes. Ammonia obviously isn't an element, the symbol for technetium isn't Te and "vandium" slipped past the editors too. These superficial errors are easily forgiven, however, especially when you read passages like "There's no material safety data sheet for astatine. If there were, it would just be the word 'NO' scrawled over and over in charred blood."

There are many other questions in the book that I really enjoyed, including: if everyone on the planet stayed away from each other for a couple of weeks, wouldn't the common cold be wiped out? (answer: no); what would happen if someone's DNA suddenly vanished? (answer: it's not good); and what is the farthest one human being has ever been from every other living person (answer: it's hard to know for sure).

Many of the questions are truly absurd, but the answers are truly fascinating and are laid out step-by-step in glorious (and easy-to-follow) detail. But it's more than just that, the book is delightfully funny — not least the illustrations and the footnotes. In answering a question about how many Lego bricks it would take to build a bridge capable of carrying traffic from London to New York, Munroe uses six footnotes to discuss different styling of the word Lego — and it's utterly brilliant. Just like the book itself. ❐



COURTESY OF HOUGHTON MIFFLIN HARCOURT/ RANDALL MUNROE

REVIEWED BY STUART CANTRILL

Stuart Cantrill is the Chief Editor of Nature Chemistry. *A version of this article first appeared on the author's blog (http://stuartcantrill.com/2015/02/06/what-if-i-read-more-books-this-year/).*