

The highest melting point challenge

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We would like to invite you to participate in the Analytical Challenge, a series of puzzles to entertain and challenge our readers. This special feature of “Analytical and Bioanalytical Chemistry” has established itself as a truly unique quiz series, with a new scientific puzzle published every other month. Readers can access the complete collection of published problems with their solutions on the ABC homepage at <http://www.springer.com/abc>. Test your knowledge and tease your wits in diverse areas of analytical and bioanalytical chemistry by viewing this collection.

In the present challenge, melting points is the topic. And please note that there is a prize to be won (a Springer book of your choice up to a value of €100). Please read on...

Meet the highest melting point challenge

Melting points of substances and materials are important in science and engineering. Considerations of this parameter are also relevant in everyday life. Chocolate and lipstick, for example, are two common consumer products for which the appropriate melting point can make all the difference.

Which element has the highest melting point? A quick Google search will soon lead you to choose your own answer! Some say that carbon has the highest melting point of all elements [1, 2], whereas others say it is tungsten (which is why tungsten filaments are used in light bulbs) [3, 4]. To make things even more complicated, the melting point depends on the pressure. In fact, carbon does not melt at all at ambient pressure; a liquid phase of carbon only exists above pressures of 10 MPa.

Many, no doubt, have asked the following question: which substance has the highest melting point? The 14th edition of *Encyclopaedia Britannica* provides an answer to this ques-

tion, as do countless textbooks [5]. The answer given in countless textbooks seems simple [6]:

“HfTa₄C₅ has the highest melting point of any known material: 4215 °C.”

Can you trace the provenance of this ubiquitous statement and find out why it is incorrect?

References

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2. Krueger A (2010) Carbon materials and nanotechnology. Wiley, Weinheim
3. Ebbing D, Gammon SD (2007) General chemistry, 8th edn. Houghton Mifflin Co., Boston
4. Karukstis KK, van Hecke GR (2003) Chemistry connections: the chemical basis of everyday phenomena, 2nd edn. Elsevier Science, New York
5. Mackay RA, Henderson W (2002) Introduction to modern inorganic chemistry, 6th edn. CRC, Boca Raton
6. Emsley J (2011) Nature's building blocks. Oxford University Press, Oxford

We invite our readers to participate in the Analytical Challenge by solving the puzzle above. Please send the correct solution to abc-challenge@springer.com by June 1, 2015. Make sure you enter “Highest melting point challenge” in the subject line of your e-mail. The winner will be notified by e-mail and his/her name will be published on the “Analytical and Bioanalytical Chemistry” homepage at <http://www.springer.com/abc> and in the journal (volume 407/issue 22), where readers will find the solution and a short explanation.

The next Analytical Challenge will be published in 407/17, July 2015. If you have enjoyed solving this Analytical Challenge, you are invited to try the previous puzzles on the ABC homepage.

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