

Solution to the “never odd or even” challenge

Reinhard Meusinger¹

Accepted: 8 July 2021 / Published online: 11 October 2021
© Springer-Verlag GmbH Germany, part of Springer Nature 2021

The winner of the ‘Never odd or even’ challenge (published in volume 413 issue 9) is: Alvaro Etcheverry Berrios, The University of Edinburgh, Edinburgh, Scotland, UK.

The award entitles the winner to select a Springer book of their choice up to a value of €100,-.

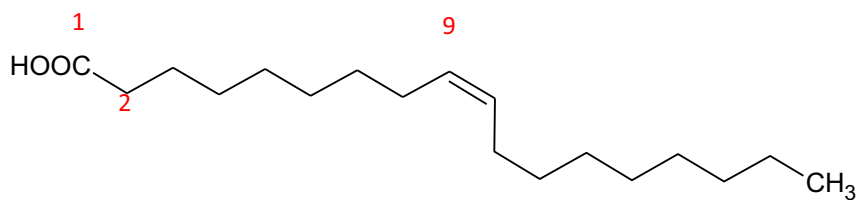
Our Congratulations!

The well-known substance described in the *never odd or even* challenge [1] is oleic acid. The name derives from the Latin word *oleum*, meaning oil obtained from **olives**, the fruits of *Olea europaea* (Fig. 1).

Oleic acid is a naturally occurring monounsaturated fatty acid with an unbranched chain of eighteen carbon atoms, with a carboxyl group at one end and a methyl group at the other end. The numbering scheme recommended by the IUPAC is indicated by counting from 1 starting from the carboxyl end. The position of the *cis*-configured double bond is specified by labelling the unsaturated carbon closest to the carboxyl end as shown in Formula 1 [2].

An abbreviated form of the IUPAC notation is the lipid number where oleic acid is known as 18:1(9) or *cis*- Δ^9 -octadecenoic acid where the capital Greek letter Δ corresponds to Roman “D”, for double bond. The IUPAC notation has the advantage of being more clear and descriptive than common lipid name nomenclature or the physiological numbering convention. In the latter, the last carbon in the chain is labelled with letter *n*. This ‘*n*–*x*’ nomenclature provides names of individual compounds and classifies them by their likely biosynthetic pathway. In oleic acid, the double bond is located on the 9th carbon–carbon bond, counting from the methyl end of the molecule backbone. Therefore, it is classified as *n*–9 fatty acid as shown in Formula 2.

In nutritional literature, the methyl end of the chain is often designated with the last letter of the Greek alphabet — omega (ω). In this convention, oleic acid is an omega–9 or ω –9 fatty acid. Coincidentally, it does not matter which notation is used



This article is the solution to the Analytical Challenge to be found at <https://doi.org/10.1007/s00216-021-03235-5>

✉ Reinhard Meusinger
meusi@nmr.chemie.tu-darmstadt.de

¹ Institute of Organic Chemistry and Biochemistry, University of Technology Darmstadt, Alarich-Weiss-Str. 4, 64287 Darmstadt, Germany

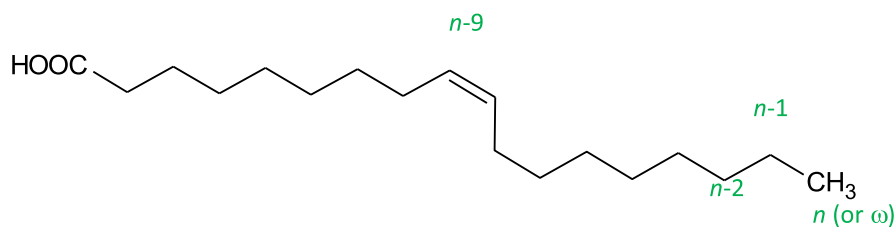


Fig. 1 Olive tree (*Olea europaea*) with ripe fruits

for oleic acid since the double bond is the ninth from either end of the molecule. Whether you count from front to back or back to front, the result is the same, just like a palindrome. Table 1 summarizes the various approaches used to name oleic acid.

Table 1 Five nomenclatures for one molecule

Trivial name	Oleic acid
Systematic name (IUPAC)	(9 <i>Z</i>)-Octadecenoic acid
Δ^x (delta- <i>x</i>) nomenclature	<i>cis</i> - Δ^9 -octadecenoic acid
Lipid number	18:1(9)
<i>n</i> - <i>x</i> (ω - <i>x</i> or omega- <i>x</i>) nomenclature	(<i>n</i> -9) fatty acid

Declarations

Conflict of interest The author declares no competing interests.

References

1. Meusinger R. *Anal Bioanal Chem.* 2021;413:2277–80.
2. The Nomenclature of Lipids. Recommendations, 1976. *European Journal of Biochemistry.* 1977;79(1):11–21. <https://doi.org/10.1111/j.1432-1033.1977.tb11778.x>.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.