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Letter to the Editor

The calculation of area factors without the use of pure components of analysed mixtures

Sir,

In the January issue of this journal, a letter by Novák appeared¹, dealing with the relationship between the so-called "method of controlled internal normalization"² and the linear relationship method³⁻⁷ described by the writer of this letter.

Novák's letter¹ contains, however, erroneous and misleading statements, which should be discussed in more detail.

I was made aware of Novák's paper² from the referee's report (October, 1972) on a paper by myself which has not yet been published; *Chemické Listy* is difficult for me to understand, as it is for other foreign readers. Therefore Novák's allegation that "I realize that *Chemické Listy* is a rather obscure journal and is difficult to understand for most foreign readers, but the case discussed here is the most favourable exception from these limitations" is simply not justified.

Novák's claim that his paper² contains the original idea of the linear relationship method should be dismissed, at least, for the reasons given in his own letter.

The expressions $\sum_{j \neq YZ} A_j f_j^w$ in eqn. 3.46^{1,2} can be simply reduced as they have no influence on g_i . The term g_i is the weight fraction of a solute substance (i) in the mixture under analysis; for other notations, see ref. 1. Therefore, eqn. 3.46 is typical for the internal standard technique, but its relation to the method of controlled internal normalization has not been defined. "When reducing the situation to a trivial case by putting $Y=0$ (all the components are eluted and detected) and assuming Z to be a component involved in the normalization procedure ($Z=j$)", then the results obtained by Novák are not correct, as (1) $g_i = A_i f_i^w / \sum_j A_j f_j^w$ is obviously not equal to g_i obtained from eqn. 3.46 and (2) the equation $\sum_j A_j f_j^w / A_z f_z^w = W_{(i)} / W_z$, although evidently identical with eqn. 3 of my paper³, does not hold when $Z=j$, being true only in the opposite case, when $Z \neq j$. All that can be stated about this "trivial case" is that it was possible to obtain eqn. 3 of my paper³ (one of the procedures of the linear relationship method) by starting with the internal standard and internal normalization techniques. Although this could be done, it was not done in Novák's paper² and it was not done correctly even in Novák's letter. In the context of Novák's letter and the equations in his paper², it is not possible to state what procedure had really been described on p.1305 of that paper.

Although eqn. 3 of my paper³ can be obtained by starting with the internal standard and internal normalization techniques, it does not follow that the linear relationship method is a combination of both of these methods. In the linear relationship method, the internal standard is added only to quantify precisely the sample injection charge into the column, and if this could be done in some other way, no standard needs to be added (see also procedures 2 and 3³).

Even if the "trivial case" discussed above had been solved correctly by Novák, it would not have been proof of the more general assertion that the method of controlled internal normalization "was formulated in such a way that it provides for the determination of both the contents and response factors of substances that do not appear in the chromatogram at all, along with those that are eluted and detected normally". Unfortunately, this statement is also not true. It is obvious that no response factor can be determined if the component is not detected. In the case of any doubt, experimental verification of that promising declaration will be necessary, as manipulation of equations cannot be accepted. I hope that an exact English translation of Novák's paper will be published in the near future so that it will be possible to discover what the method of controlled internal normalization really is.

One might regret that the linear relationship method was challenged, but before this the relevant papers^{3,6} had not been consulted in more detail.

Finally, it is strange that the method of controlled internal normalization, although being claimed nowadays by Novák to be so promising, has not been verified experimentally (Novák's letter contains no information on this aspect) and, even more strange, it did not receive any attention in the paper by Novák *et al.* on the statistical analysis of the techniques of quantitative gas chromatography published in English in this journal⁸.

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REFERENCES

- 1 J. Novák, *J. Chromatogr.*, 75 (1973) 173.
- 2 J. Novák, *Chem. Listy*, 62 (1968) 1281.
- 3 A. Janik, *J. Chromatogr.*, 54 (1971) 321.
- 4 A. Janik and J. Hetper, *J. Chromatogr.*, 54 (1971) 327.
- 5 J. Hetper and A. Janik, *J. Chromatogr.*, 64 (1972) 162.
- 6 A. Janik, *J. Chromatogr.*, 69 (1972) 231.
- 7 A. Janik, *Chem. Anal. (Warsaw)*, 18 (1973) 23.
- 8 P. Boček, J. Novák and J. Janák, *J. Chromatogr.*, 42 (1969) 1.