

CHROM. 6867

Letter to the Editor

Calculation of response factors in gas chromatography

Sir,

Dr. Janik's reply to my letter¹ deserves some comment. Owing to the close similarity between the Polish and Czech languages, Dr. Janik's difficulties in understanding *Chemická Listy* could perhaps be conceived as an unfavourable exception from the most favourable one mentioned in my former letter. As for Dr. Janik's discussion of eqn. 3.46 mentioned in my letter, I would like Dr. Janik to realize that the term he suggests to be cancelled is just what defines the interrelationship between the concepts of the normalization and internal standard techniques. Further, if our "trivial case" still presents a problem, I recommend to Dr. Janik that he choose some numerical data in order to prove that the values of g_i calculated from eqn. 3.46 and from $g_i = A_i f_i^w / \sum_j A_j f_j^w$ are the same if $Z=j$. For instance, consider a ternary mixture of components 1, 2 and Z, giving A_1 , A_2 and A_Z equal to 2, 3 and 5, respectively, f_1^w , f_2^w , and f_Z^w being equal to unity. As i represents any of the components j , including Z, it is evident that $A_Z f_Z^w / \sum_j A_j f_j^w = W_Z / W_{(1)}$, and eqn. 3.46 gives, for example, $g_2 = 3/10$. The result obtained from direct normalization is obviously the same. Hence, Dr. Janik is not correct in this respect.

As for Dr. Janik's problem of recognizing which procedure has been described on p. 1305 of my paper in *Chemická Listy*², I can help him by stating that it is just the concept of his linear relationship method (cf. the last two paragraphs on that page). Concerning the problem of the originality of the linear relationship method, Dr. Janik's argument based on the role of the internal standard in his procedure is very weak, as it is with any internal standardization technique in which the standard is used merely to give a measure of the amount of sample introduced. It is very difficult to prove that this method is neither mere normalization nor a combination of the methods of normalization and internal standardization, the same as the method of controlled internal normalization. The principle and also the possibilities and limitations of the latter method have been described in detail in the respective paper² (cf. pp. 1296-1298). An unsuitable formulation I used in my former letter ("determination of both the contents and response factors of substances that do not appear in the chromatogram at all") gave Dr. Janik a basis for criticizing the method, thus deviating substantially from the main point of discussion. However, his criticism does not apply to what was originally written about the method in my paper². I, of course, agree with Dr. Janik that the determination of the response factors of undetected substances is not feasible (unless we consider zero response factors); in accordance with what has been stated in my paper, the method of controlled internal normalization provides for the determination of both the contents of substances that do not appear in the chromatogram at all and the response factors of unidentified substances, without the necessity of using pure components of the mix-

ture being analyzed. This correction evidently has no effect on any of my arguments on the points presented in my earlier letter¹.

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REFERENCES

- 1 J. Novák, *J. Chromatogr.*, 75 (1973) 173.
- 2 J. Novák, *Chem. Listy*, 62 (1968) 1281.