

## Letter to the Editor

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### On some nomenclature in chromatography

Sir,

Our present-day chromatographic nomenclature has resulted from intensive discussions among various groups in many countries over a number of years. The nomenclatures of gas and liquid chromatography and their variants, developed and published by the British Standards Institution, the American Society for Testing and Materials and the International Union of Pure and Applied Chemistry were excellently reviewed by Ettre<sup>1-3</sup> with special emphasis on its evolution and recommendations by early *ad hoc* Committees. He gave numerous valuable proposals for consideration in future revisions of chromatography nomenclature.

However, two broad areas of classification, namely, inverse chromatography and reversed-phase chromatography, seem to need attention. To my knowledge, the first term was not included in the recommended chromatography nomenclature when it was felt necessary to reconsider the latter term. They are discussed in this letter and a more scientific nomenclature is proposed for possible inclusion in future revisions of chromatography nomenclature.

#### *Inverse chromatography*

The first use of the term "inverse chromatography" is attributed to Davis and Petersen<sup>4</sup>, who applied the technique to the determination of the degree of oxidation of asphalt. Since then, the technique has been applied by many workers, especially by Guillet<sup>5</sup> in the study of synthetic polymers.

In conventional gas chromatography, the properties of an unknown sample in the mobile phase are determined by interaction with a known stationary phase. An inverse sequence of information is obtained in inverse gas chromatography, where the properties of an unknown stationary phase are determined by its interaction with selected probe molecules in the mobile phase. The vaporizable molecules in the gas phase were designated "probe" molecules by Guillet<sup>5</sup>. In my opinion, it is inappropriate to classify chromatography on the basis of the sequence of information obtainable and call it "inverse chromatography". It is therefore suggested that it be given a special name, "molecular probe chromatography" (MPC). The technique is used in both gas and liquid chromatography. Hence MPC may be defined as a branch of chromatography where the properties of an unknown stationary phase are studied by interaction with probe molecules in the mobile phase. The term MPC has been used previously<sup>6,7</sup> in studies on coal.

#### *Reversed-phase chromatography*

Chromatography has been subdivided on the basis of a number of principles. Subdivision on the basis of the relative polarities of the two phases is particularly important in liquid chromatography. Unlike gas chromatography, the mobile phase

in liquid chromatography represents an additional component influencing the separation mechanism. In practical liquid chromatography these subdivisions can be put into two variants. In the first, the stationary phase is more polar than the mobile phase while in the second case the opposite is true. The first variant is called normal-phase chromatography and the second reversed-phase chromatography.

In normal-phase chromatography specific interactions occur between the solute and the stationary phase and the retention of compounds depends mainly on the type of functional groups present in the molecule. On the other hand the solute – stationary phase interactions in reversed phase chromatography is due to a kind of hydrophobic sorption by means of non-specific dispersion forces. The hydrophobic part of the solute is preferentially sorbed on the hydrophobic surface of the stationary phase and the hydrophilic part of the solute is oriented towards the polar mobile phase. The sorption process is modified when the balance of the hydrophobic – hydrophilic effects of the solute and/or solvent is changed. The behaviour in the mobile phase is therefore predominant here.

Reversed-phase chromatography was originally introduced in 1950 by Howard and Martin<sup>8</sup> and was widely used in paper chromatography in those days. To-day it has become the most widely used variant of liquid chromatography, accounting for as many as 70% of modern high-performance liquid chromatographic applications<sup>9</sup>.

Nevertheless, the expression reversed-phase is confusing. It is not the phase that is reversed but the polarity of the phase. It is, therefore, proposed to call it “reversed-polarity chromatography” and the former “normal-polarity chromatography”.

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