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Sorption properties of the arylarsin acids in relation to organic solvents

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Abstract

In this paper studied the sorption properties of number arylarsines acids that are used as selective stationary phases in liquid sorbents for gas chromatographic separation of organic compounds.

For a number of compounds are investigated experimentally obtained values of chromatographic polarity Rohrschneider factors and their difference. It is shown that all the investigated compounds are characterized by relatively high values of chromatographic factor polarity (y), which describes the ability arylarsinoes acids enter into intermolecular interactions in the molecules of alcohols with the formation of hydrogen bonding due to the presence of the lone electron pair arsenic oxygen.

We also assessed the selectivity of separation hydroxy compounds from other classes of organic compounds with different types of intermolecular interactions. In almost all cases highest polarity factors difference value characteristic arylarsines acids when electron donating substituents are in the *para* position of the phenyl ring.

On the basis of the data constructed combined plot of chromatographic factors polarity and their difference, which shows that the points corresponding to the studied sorbents are grouped into characteristic areas corresponding increase capacity arylarsines acids to form intermolecular hydrogen bonds, energy education which is significantly affected by the nature of the electron donor substitute and its spatial position. It is revealed that the highest selectivity and separation of aromatic hydroxyl compounds observed for arylarsine acid methyl substituent located in the *ortho*-position of the phenyl ring.

To assess the contribution to the value of the difference polarity chromatographic factors Brown Triangle was built. The analysis of the data observed quite a significant influence of the nature of electron donor substituents.

The influence of electron-donating substituents and their spatial arrangement is useful in the synthesis and preparation of new stationary liquid phases and sorbents with adjustable selective separation of organic substances of different nature.

References

[1] V.S. Gamayurova. Nukleotic and fundamental properties of arsenic connections. *Russian Chemical Reviews*. **1981**. Vol.50. P.1601-1626. (russian)
[2] V.F. Novikov Organic derivatives of phosphorous and arsenic as stationary phases for gas chromatography. *Russian Journal of Physical Chemistry*. **1993**. Vol.67. No.4. P.848-853. (russian)
[3] V.F. Novikov, N.V. Shabrucova, Y.K. Averyanov, V.S. Gamayurova. Study of sorption properties of bis (fenil arsenic) acids. *Russian Journal of Applied Chemistry*. **1985**. No.6. P.1410-1413. (russian)
[4] A.V. Taneeva, O.V. Ilyina, I.S. Levin, A.A. Kartashova, V.S. Gamayurova, V.F. Novikov. Chromatographic properties of arilarsin's acids. *Bulletin of the Technological University*. **2011**. No.3. P.282-285. (russian)

[5] V.F. Novikov, A.A. Kartashova, I.A. Galishiva, O.I. Fedorenko, A.V. Taneeva. Study of new sorbents for the gas chromatography analysis of furan derivatives in transformer oil. *Bulletin of the Technological University*. **2015**. Vol.18. No.2. P.99-103. (russian)
[6] A.A. Kartashova, V.F. Novikov. Chromatographic factors polarity of arilarsin acids. *Proceedings of the conference "Analytical chromatography and capillary electrophoresis", Krasnodar: KubSU*. **2013**. P.348. (russian)
[7] A.A. Kartashova, V.F. Novikov. Determination of furan compounds in transformer oils by gas chromatography with the new sorbents. *Proceedings of the Higher Educational Institutions. Energy Sector Problems*. **2016**. No.1-2. P.46-52. (russian)
[8] E. Kovatc. *Helv. chim. Acta*. **1958**. Vol.41. P.1915-1918.
[9] I.R. Rohrschneider. Method of characterization for gas chromatographis separation of liquids. *G. Chromatogr*. **1966**. Vol.22. No.1. P.6-22.
[10] B.D. Chernokalsky, A.S. Gelfond, G.H. Kamay. *Russian Journal of General Chemistry*. **1968**. Vol.39. P.829-833. (russian)
[11] I.P. Gol'shteyn, T.I. Perepelkova, E.N. Gyrianova, L.K. Vasyanina, K.A. Kocheshkov. *Reports of the USSR Academy of Sciences*. **1976**. Vol.226. P.91-94. (russian)
[12] O.N. Dvorskaya, S.S. Kataev, I.P. Krokhin. Identification several of NSAIDs in blood screening by solid-phase extraction and gas chromatography-mass spectrometry. *Butlerov Communications*. **2015**. Vol.43. No.7. P.149-153. ROI: jbc-02/15-43-7-149
[13] P.V. Lapsina, L.V. Sotnikova. Development of the method of analysis of aromatic hydrocarbons benzene series by gas chromatography-mass spectrometry the example of ozonated raw benzene. *Butlerov Communications*. **2015**. Vol.44. No.12. P.101-106. ROI: jbc-02/15-44-12-101
[14] B.D. Chernokalsky, A.S. Gelfond, G.H. Kamay. *Russian Journal of General Chemistry*. **1968**. Vol.38. P.2108-2112. (russian)
[15] J. Brown. *G. Cromatogr*. **1963**. Vol.10. P.284-293.