Reverse Microemulsion Chromatography on the Basis of Brij 30 and AOT Micellar Mobile Phases

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The widespread applications of microemulsions is mainly conditioned by their flexibility, viz. by ability of microemulsions to change their internal structure under the influence of different additives [1]. Control of water pools structure of reverse micelles via introducing of ions in the water pockets of reverse micelle is especially important since the interior dimensions of reverse micelles are similar to confined spaces found in cavities in biological systems [2].

The aim of the presented work was study of influence of the composition of reverse microemulsions on the basis of polyoxyethylene (4) lauryl ether (Brij 30) and sodium bis (2-ethylhexyl) sulfosuccinate (AOT) on the chromatographic retention factor of some solutes of biomedical significance. Investigation of influence of kosmotropic and chaotropic anions on the retention of the model compounds was also the purpose of the presented work.

Microemulsion mobile phases were prepared on the basis of Brij-30 and AOT, hexane, butanol, water, water solutions of sodium acetate and potassium perchlorate. The liquid chromatographic measurements were carried out with a Silasorb C_2 stainless steel column. Detection wavelengths were 250 and 280 nm.

Increasing of water content in the mixed reverse microemulsion mobile phases causes a reduction of retention factor (k) of polar solutes, but retention of neutral samples is remained unchanged. Retention factors of solutes are increased by preparation of reverse microemulsion on the basis of acetate solution in comparison of pure water, but retention of the model compounds are decreased in case of perchlorate solution. This means, that solubility of drugs in the water core of the reversed micelle is altered in the presence of salts additives and consequently retention factors are changed. Introducing of salts in the water core of reverse micelles influence the structure of water, which is reflected in the changes of solubility of the solutes in the water pockets of reverse micelles and consequently their k is changed.

Additionally an interesting observation, concerning the maximal upload of aqueous phase in the oil phase, until turbidity occurs, is made. Water with addition of chaotropic perchlorate is absorbed by the mixture of oil and nonionic surfactant in quantity of 0.56% (v/v), whereas the maximum value of absorbed water with additives of kosmotropic acetate at the same salt concentrations reaches only 0.37%. These data are reversed in case of oil and anionic surfactant. These distinct values of maximum water content in microemulsion may be explained by the dissimilar influence of kosmotropic and chaotropic anions on the water structure.

The results of elution of solutes with biomedical significance by using of reverse micellar mobile phases on the basis of nonionic Brij-30 and anionic AOT surfactants may be useful in the investigations of structure of confined water in biological systems.

References

[1] Microemulsions – An Introduction to Properties and Applications Introduction. Edited by Reza Najjar. p.3-30

[2] N.E.Levinger, Science, 298 (2002) 1722