

SMART COLORIMETRIC DETERMINATION OF IONIC SURFACTANTS WITH BROMOTHYMOL BLUE AT THE PRESENCE OF NONIONIC SURFACTANT TRITON X-100

L. KORZHAN, S. KULICHENKO, S. LELYUSHOK

References:

1. Fernandes, G. M.; Silva, W. R.; Barreto, D. N.; Lamarca, R. S.; Lima Gomes, P. C. F.; Flávio da S. Petrucci, J.; Batista, A. D. Novel approaches to colorimetric measurements in analytical chemistry – A review. *Anal. Chim. Acta.* 2020, 1135, 187-203.
2. Fan, Y.; Li, J.; Guo, Y.; Xie, L.; Zhang, G. Digital image colorimetry on smartphone for chemical analysis: A review. *Meas. Sci. Technol.* 2021, 171, 108829.
3. Zhang, D.; Liu, Q. Biosensors and bioelectronics on smartphone for portable biochemical detection. *Biosens. Bioelectron.* 2016, 75, 273–284.
4. Hou, P.; Deng, R.; Guo, J.; Chen, W.; Li, X.; Yu, H.-Z. A WiFi scanner in conjunction with disposable multiplex paper assay for the quantitation of disease markers in blood plasma. *Anal. Bioanal. Chem.* 2021, 413(18), 4625–4634.
5. Su, K.; Xiang, G.; Cui, C.; Jiang, X.; Sun, Y.; Zhao, W.; He, L. Smartphone-based colorimetric determination of glucose in food samples based on the intrinsic peroxidase-like activity of nitrogen-doped carbon dots obtained from locusts. *Arab J Chem.* 2023, 16(3), 104538.
6. Deilamy-Rad, G.; Asghari, K.; Tavallali, H. Development of a Reversible Indicator Displacement Assay Based on the 1-(2-Pyridylazo)-2-naphthol for Colorimetric Determination of Cysteine in Biological Samples and Its Application to Constructing the Paper Test Strips and a Molecular-Scale Set/Reset Memorized Device. *Appl. Biochem. Biotechnol.* 2020, 192, 85-102
7. Wang, Y.; Yang, L.; Liu, B.; Yu, S.; Jiang, C. Colorimetric Paper Sensor for Visual Detection of Mercury Ions Constructed with Dual-Emission Carbon Dots. *New J. Chem.* 2018, 42(19)
8. Song, X.; Wang, Y.; Liu, S.; Zhang, X.; Wang, H.; Wang, J.; Huang, J. Colorimetric and visual mercury(II) assay based on target-induced cyclic enzymatic amplification, thymine-Hg(II)-thymine interaction, and aggregation of gold nanoparticles. *Microchim. Acta.* 2019, 186(2).
9. Bai, Z.; Wei, H.; Yang, X.; Zhu, Y.; Peng, Y.; Yang, J.; Wang, C.; Rong, Z.; Wang, S. Rapid Enrichment and Ultrasensitive Detection of Influenza A Virus in Human Specimen using Magnetic Quantum Dot Nanobeads Based Test Strips. *Sens. Actuators, B.* 2020, 325, 128780.
10. Aveyard, B. (Ed.) Surfactants: in solution, at interfaces and in colloidal dispersions; Oxford University Press: Oxford, 2019; p. 576.
11. Olkowska, E.; Polkowska, Ż.; & Namieśnik, J. Analytical procedures for the determination of surfactants in environmental samples. *Talanta.* 2012, 88, 1–13.
12. Madunić-Čačić, D.; Sak-Bosnar, M.; Galović, O.; Sakač, N.; Matešić-Puač, R. Determination of cationic surfactants in pharmaceutical disinfectants using a new sensitive potentiometric sensor. *Talanta.* 2008, 76 (2), 259–264.
13. Sakac, N.; Madunic-Cacic, D.; Marković, D.; Hok, L.; Vianello, R.; Sarkanj, B.; Đurin, B.; Hajdek, K.; Smoljan, B.; Milardović, S.; Matasović, B.; Jozanović Horvat, M. Potentiometric Surfactant Sensor Based on 1,3-Dihexadecyl-1H-benzo[d]imidazol-3-ium for Anionic Surfactants in Detergents and Household Care Products. *Molecules.* 2021, 26, 3627.
14. Biswas, S.; Pal, A. Spectrophotometric determination of cationic surfactants in aqueous media using chrome azurol S as colour forming agent and 1-butanol as extracting solvent. *Talanta.* 2020, 206, 120238.
15. Nakov, N.; Acevska, J.; Brezovska, K.; Petkovska, R.; Dimitrovska, A. Optimization of hydrophilic interaction liquid chromatographic method for simultaneous determination of cetylpyridinium chloride and benzocaine in lozenges. *Maced. J. Chem. Chem. En.* 2012, 31 (1), 47–54.
16. Caleb, J.; Alshana, U. Supramolecular solvent-liquid-liquid microextraction followed by smartphone digital image colorimetry for the determination of curcumin in food samples. *Sust. Chem. Pharm.* 2021, 21, 100424.
17. Rahman, N.; Manirul Haque, S.; Azmi, S. N. H.; Rahman, H. Optimized and validated spectrophotometric methods for the determination of amiodarone hydrochloride in commercial dosage forms using N-bromosuccinimide and bromothymol blue. *J. Saudi Chem. Soc.* 2017, 21(1), 25-34.
18. Omara, H. A.; Amin, A. S. Extractive-spectrophotometric methods for determination of anti-Parkinsonian drug in pharmaceutical formulations and in biological samples using sulphonphthalein acid dyes. *J. Saudi Chem. Soc.* 2012, 16(1), 75-81.
19. Klovak, V.; Kulichenko, S.; Lelyushok, S. Charge, hydrophobic and spatial matching in the association of fluorescent reagents with ionic surfactants in aqueous solutions. *Chem. Pap.*, 2021, 75 (6), pp 2477–2484.

20. Klovak, V.; Kulichenko, S.; Lelyushok, S. Influence of colloid-chemical state of solutions on fluorescence and spectrophotometry analytical signals of surfactants in reaction with eosin Y. *Chem. Pap.* 2020, 74, 4337–4344.
21. Klovak, V.; Kulichenko, S. Matching Effects in the Interaction of Ionic Surfactants with Fluorescent Reagents in Micellar Solutions of Triton X-100. *Methods Objects Chem. Anal.* 2021, 16, 3, 117-126
22. Küster, F. W.; Thiel, A. *Analytik – Daten, Formeln, Übungsaufgaben*. 108. Auflage. Berlin, De Gruyter, 2016. ISBN 978-3-11-041495-0.
23. Najib, F.M.; Hama Aziz, K. H. Spectrophotometric determination of lamotrigine in pharmaceutical preparations and urine samples using bromothymol blue and bromophenol blue. *Malaysian J. Anal. Sci.* 2013, 17, 310-325.
24. Shimada, T.; Hasegawa, T. Determination of equilibrium structures of bromothymol blue revealed by using quantum chemistry with an aid of multivariate analysis of electronic absorption spectra. *Spectrochim. Acta, Part A*. 2017, 185, 104–110.
25. Klotz, E.; Doyle, R.; Gross, E.; Mattson, B. The Equilibrium Constant for Bromothymol Blue: A General Chemistry Laboratory Experiment Using Spectroscopy. *J. Chem. Educ.* 2011, 88(5), 637–639.
26. Zhang L.; Chai X.; Sun P.; Yuan B.; Jiang B.; Zhang X.; Liu M. The Study of the Aggregated Pattern of TX100 Micelle by Using Solvent Paramagnetic Relaxation Enhancements. *Molecules*. 2019, 24(9), 1649.