

SIMULTANEOUS DETERMINATION OF TARTRAZINE, PATENTED BLUE V AND BRILLIANT BLUE FCF BY SPECTROPHOTOMETRY WITH CHEMOMETRIC ALGORITHMS

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References:

1. Amador-Hernandez J.; Rojas-Hernandez, A.; Colunga-Urbina, E. M.; et al. New Chemometric Strategies in the Spectrophotometric Determination of pK_a . *Eur. J. Chem.* **2014**, 5 (1), 1–5.
2. DiAnibal, C. V.; Odena, M.; Ruisánchez, I.; et al. Determining the Adulteration of Spices with Sudan I-II-II-IV Dyes by UV-Visible Spectroscopy and Multivariate Classification Techniques. *Talanta*. **2009**, 79 (3), 887–892.
3. Fearn, T. Chemometrics: An Enabling Tool for NIR. *NIR news* 2013, 16 (7), 17–19.
4. Kumar, N.; Bansal, A.; Sarma, G. S.; et al. Chemometrics Tools Used in Analytical Chemistry: An Overview. *Talanta*. **2014**, pp 186–199.
5. Llamas, N. E.; Garrido, M.; Nezio, M. S. Di; et al. Second Order Advantage in the Determination of Amaranth, Sunset Yellow FCF and Tartrazine by UV-Vis and Multivariate Curve Resolution-Alternating Least Squares. *Anal. Chim. Acta*. **2009**, 655 (1–2), 38–42.
6. Parastar, H.; Shaye, H. Comparative Study of Partial Least Squares and Multivariate Curve Resolution for Simultaneous Spectrophotometric Determination of Pharmaceuticals in Environmental Samples. *RSC Adv.* **2015**, 5 (86), 70017–70024.
7. Bevilacqua, M.; Bucci, R.; Magri, A. D.; et al. Tracing the Origin of Extra Virgin Olive Oils by Infrared Spectroscopy and Chemometrics: A Case Study. *Anal. Chim. Acta*. **2012**, 717, 39–51.
8. Borba, F. de S. L.; Honorato, R. S.; Juan, A. de. Use of Raman Spectroscopy and Chemometrics to Distinguish Blue Ballpoint Pen Inks. *Forensic Sci. Int.* **2015**, 249, 73–82.
9. El-Kosasy, A. M.; Abdel-Aziz, O.; Magdy, N.; et al. Spectrophotometric and Chemometric Methods for Determination of Imipenem, Ciprofloxacin Hydrochloride, Dexamethasone Sodium Phosphate, Paracetamol and Cilastatin Sodium in Human Urine. *Spectrochim. Acta. - Part A Mol. Biomol. Spectrosc.* **2016**, 157, 26–33.
10. Feng, F.; Zhao, Y.; Yong, W.; et al. Highly Sensitive and Accurate Screening of 40 Dyes in Soft Drinks by Liquid Chromatography-Electrospray Tandem Mass Spectrometry. *J. Chromatogr. B Anal. Technol. Biomed. Life Sci.* **2011**, 879 (20), 1813–1818.
11. Ghanbari, K.; Roushani, M.; Farzadfar, F.; et al. Developing a Four-Dimensional Voltammetry as a Powerful Electroanalytical Methodology for Simultaneous Determination of Three Colorants in the Presence of an Uncalibrated Interference. *Chemom. Intell. Lab. Syst.* **2019**, 189, 27–38.
12. Hudari, F. F.; Brugnera, M. F.; Zanoni, M. V. B. Advances and Trends in Voltammetric Analysis of Dyes. In Applications of the Voltammetry; **2017**; p 75.
13. Amchova, P.; Kotolova, H.; Ruda-Kucerova, J. Health Safety Issues of Synthetic Food Colorants. *Regul. Toxicol. Pharmacol.* **2015**, 73 (3), 914–922.
14. Kamel, M. M.; El Saharty, S. The Potential Health Hazard of Tartrazine and Levels of Hyperactivity, Anxiety-like Symptoms, Depression and Anti-Social Behaviour in Rats. *J. Am. Sci.* **2011**, 7 (6), 1211–1218.
15. Khayyat, L.; Essawy, A.; Sorour, J.; et al. Tartrazine Induces Structural and Functional Aberrations and Genotoxic Effects in Vivo. *PeerJ.* **2017**, 5, e3041.
16. Reyes, F. G.; Valim, M. F.; Vercesi, A. E. Effect of Organic Synthetic Food Colours on Mitochondrial Respiration. *Food Addit. Contam.* **1996**, 13 (1), 5–11.
17. Parpinello, G. P.; Ricci, A.; Laghi, L.; et al. Progress in Authentication, Typification and Traceability of Grapes and Wines by Chemometric Approaches. *Food Res. Int.* **2014**, 60, 2–18.
18. Roggo, Y.; Degardin, K.; Margot, P. Identification of Pharmaceutical Tablets by Raman Spectroscopy and Chemometrics. *Talanta*. **2010**, 81 (3), 988–995.
19. Shen, F.; Yang, D.; Ying, Y.; et al. Discrimination Between Shaoxing Wines and Other Chinese Rice Wines by Near-Infrared Spectroscopy and Chemometrics. *Food Bioprocess Technol.* **2012**, 5 (2), 786–795.
20. Shestopalova, N. B.; Petrovich, M. V.; Chernova, R. K. Simultaneous Determination of Synthetic Food Dyes E102 and E110. *Izv. Sar. Un.* **2016**, 16(3), 242–257.
21. Chebotarev, A.N.; Bevziuk, K.V.; Snigur, D.V. Kislотно-osnovni ta spektrofotometrični karakteristiki 5-gidroksi-1-(p-sul'fofenil)-4-[(p-sul'fofenil)-azo]-pirazol-3-karbonovoi kisloti v rozchinah. *Ukr. Chem. J.* **2014**, 80(6), 79-84.
22. Bevziuk, K.; Chebotarev, A.; Snigur, D.; Bazal, Y.; Fizer, M.; Sidey, V. Spectrophotometric and theoretical studies of the protonation of Allura Red AC and Ponceau 4R. *J.Mol.Struct.* **2017**, 1144, 216-224.
23. Bevziuk, K.; Chebotarev, A.; Fizer, M.; Klochkova, A.; Pliuta, K.; Snigur, D. Protonation of Patented Blue V in aqueous solutions: theoretical and experimental studies. *J. Chem. Sci.* **2018**, 130(2), 12.
24. Chebotarev, A.N.; Efimova, I.S. Kislотно-osnovnye svojstva funkcional'no-analiticheskikh grupp 4-sul'fo-2(4'-sul'fonaftalin-1'-azo)naftola-1 v vodnom i vodno-organicheskikh rastvorah *Methods Objects*

Chem. Anal. **2009**, 4(1),11-17.

25. Chebotarev, A.N.; Bevziuk, K.V.; Snigur, D.V.; Bazel, Y. R. The brilliant blue FCF ion-molecular forms in solutions according to the spectrophotometry data. *Russian Journal of Physical Chemistry A.* **2017**, 91(10), 1907-1912.

26. Lukianova, E. A.; Ognichenko, L. N.; Yurpalova, T. A.; et al. QSAR Analysis of Complexaton of Ethers of 7-Brom-3-Hydrxy-5-(2'-Chloro) Phenyl-1,2-Dihydro-3H-1,4- Benzodiazepin-2-Ones with Central Benzodiazepine Receptors CNS. *Odesa Natl. Univ. Herald. Chem.* **2018**, 23 (1(65)), 48–57.

27. Windig, W.; Antalek, B.; Lippert, J. L.; et al. Combined use of conventional and second-derivative data in the SIMPLISMA self-modeling mixture analysis approach. *Analytical Chemistry.* **2002**. 74 (6), 1371–1379.

28. Monakhova, Y. B.; Astakhov, S. A.; Kraskov, A.; et al. Independent components in spectroscopic analysis of complex mixtures. *Chemometrics and Intelligent Laboratory Systems.* **2010**. 103 (2). 108–115.

29. Monakhova, Y. B.; Kuznetsova, I. V.; Mushtakova, S. P. Application of modern chemometric methods to the study of equilibria in solutions. *Journal of Analytical Chemistry.* **2011**. 66 (6). 565–571.

30. Monakhova, Y. B.; Kuballa, T.; Lachenmeier, D. W. Chemometric methods in NMR spectroscopic analysis of food products. *Journal of Analytical Chemistry.* **2013**. 68 (9). 755–766.

31. General Standart for food additives. **2018**. 475 p.