

# ION-PAIR CLOUD POINT EXTRACTION METHOD FOR DAPSONE DETERMINATION USING SALBUTAMOL AS A GREEN REAGENT: APPLICATION OF ENVIRONMENTAL ASSESSMENT TOOLS BAGI, CACI, AND AGREES

RUBA FAHMI ABBAS, MARWA SABBAR FALIH, KHITAM JABER NABHAN, NEDA IBRAHIM MAHDI, DHIFAF A. ABDULABBAS

## References:

1. Ahmad, W. S., & Abdulaziz, M. S. (2021). Spectrophotometric determination of dapsone in pharmaceutical formulation by Schiff base with p-dimethylaminobenzaldehyde. *Int J Drug Delivery Tech*, 11(1), 141-146.
2. Lovell, K. K., Momin, R. I., Sangha, H. S., Feldman, S. R., & Pichardo, R. O. (2024). Dapsone use in dermatology. *American Journal of Clinical Dermatology*, 25(5), 811-822.
3. Lee, J. H., An, H. K., Sohn, M. G., Kivela, P., & Oh, S. (2020). 4, 4'-Diaminodiphenyl Sulfone (DDS) as an inflammasome competitor. *International journal of molecular sciences*, 21(17), 5953.
4. Marques, L., & Vale, N. (2022). Salbutamol in the management of asthma: A review. *International Journal of Molecular Sciences*, 23(22), 14207.
5. Peng, W., Chen, J., He, R., Tang, Y., Jiang, J., Ouyang, L., ... & Li, Y. (2023). Safety profile differences between salbutamol and levosalbutamol: Results from the FDA Adverse Event Reporting System. *Tropical Journal of Pharmaceutical Research*, 22(4), 909-915.
6. Hadjigeorgiou, M., Papachrysostomou, C., Theodorou, Z., Kanari, P., & Constantinou, S. (2009). Determination of dapsone in meat and milk by liquid chromatography tandem mass spectrometry. *Analytica chimica acta*, 637(1-2), 220-224.
7. Salama, N. N. E. D. A., El Ries, M. A., Toubar, S., Hamide, M. A., & Walash, M. I. (2012). Validated TLC and HPLC stability-indicating methods for the quantitative determination of dapsone. *JPC—Journal of Planar Chromatography—Modern TLC*, 25(1), 65-71.
8. Sichilongo, K. F., Mutsimhu, C., & Obuseng, V. C. (2013). Gas chromatography–mass spectral characteristics of six pharmacologically active compounds—analytical performance characteristics on a raw sewage impacted water sample. *Canadian Journal of Chemistry*, 91(8), 704-710.
9. McDonald, M., Mannion, C., & Rafter, P. (2009). A confirmatory method for the simultaneous extraction, separation, identification and quantification of Tetracycline, Sulphonamide, Trimethoprim and Dapsone residues in muscle by ultra-high-performance liquid chromatography–tandem mass spectrometry according to Commission Decision 2002/657/EC. *Journal of Chromatography A*, 1216(46), 8110-8116.
10. Kaklamanos, G., & Theodoridis, G. (2012). Determination of dapsone in muscle tissue and milk using high-performance liquid chromatography–tandem mass spectrometry. *Journal of agricultural and food chemistry*, 60(1), 29-35.
11. Choi, S. Y., & Kang, H. S. (2021). Multi-residue determination of sulfonamides, dapsone, ormethoprim, and trimethoprim in fish and shrimp using dispersive solid phase extraction with LC–MS/MS. *Food Analytical Methods*, 14(6), 1256-1268.
12. Leistner, A., & Holzgrabe, U. (2021). Impurity profiling of dapsone using gradient HPLC method. *Journal of Pharmaceutical and Biomedical Analysis*, 198, 113982.
13. Essousi, H., & Barhoumi, H. (2018). Electroanalytical application of molecular imprinted polyaniline matrix for dapsone determination in real pharmaceutical samples. *Journal of Electroanalytical Chemistry*, 818, 131-139.
14. Afkhami, A., Gomar, F., & Madrakian, T. (2015). Electrochemical sensor for Dapsone using molecularly imprinted polypyrrole membrane as a recognition element. *Journal of The Electrochemical Society*, 162(6), B109.
15. Malekzadeh, M., Mohadesi, A., Karimi, M. A., & Ranjbar, M. (2021). Development of a new sensitive electrochemical sensor for Dapsone detection using a Cobalt Metal-Organic framework/molecularly imprinted polymer nanostructures. *Analytical and Bioanalytical Electrochemistry*, 13(2), 226-238.
16. Essousi, H., Barhoumi, H., & Jaffrezic-Renault, N. (2019). Molecularly imprinted electrochemical sensor based on modified reduced graphene Oxide-gold Nanoparticles-polyaniline nanocomposites matrix for Dapsone determination. *Electroanalysis*, 31(6), 1050-1060.
17. da Silva, W., Queiroz, A. C., & Brett, C. M. (2020). Poly (methylene green)–Ethaline deep eutectic solvent/Fe<sub>2</sub>O<sub>3</sub> nanoparticle modified electrode electrochemical sensor for the antibiotic dapsone. *Sensors and Actuators B: Chemical*, 325, 128747.
18. Lu, F., Yang, J., Sun, M., Fan, L., Qiu, H., Li, X., & Luo, C. (2012). Flow injection chemiluminescence sensor using core-shell molecularly imprinted polymers as recognition element for determination of dapsone. *Analytical and bioanalytical chemistry*, 404(1), 79-88.

19. Wang, H. Y., Xu, L. X., Xiao, Y., & Han, J. (2004). Spectrophotometric determination of dapsone in pharmaceutical products using sodium 1, 2-naphthoquinone-4-sulfonic as the chromogenic reagent. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, 60(12), 2933-2939.
20. Al-Enizzi, M. S., SHEEJ AHMAD, O. A., & Al-Sabha, T. A. N. (2020). Spectrophotometric determination of dapsone using charge transfer complex formation reaction. *Egyptian Journal of Chemistry*, 63(8), 3167-3177.
21. Al-Samarrai, E. T., Al-Abbasi, M. A., Shubrem, A. S., Jwad, R. S., Ali, T. B., Jawad, S. F., ... & Al-Mashhadani, M. H. (2025). A Simple Spectrophotometric Method for the Determination of Dapsone Using a Dye Bleaching Approach. *Chemistry Africa*, 1-11.
22. Al-Ameer, A. H. A., & Shaalan, N. (2025). Extraction and preconcentration of many metals ions by using CPE technique. *Bulletin of the Chemical Society of Ethiopia*, 39(3), 409-423.
23. Hagarová, I. (2021). Cloud Point Extraction Used for Separation and Preconcentration of Trace Elements in Food Samples: A Review of Recent Applications. *Journal of Food Engineering and Technology*, 10(1), 1-8.
24. Kori, S. (2021). Cloud point extraction coupled with back extraction: a green methodology in analytical chemistry. *Forensic sciences research*, 6(1), 19-33.
25. Marchetti, F., Gugel, I., Costa, S., Baldini, E., Bellonzi, G., Vertuani, S., & Manfredini, S. (2024). Cloud point extraction coupled HPLC for a green downstream process and quantification of 1, 9 $\beta$ , 17, 21-tetrahydroxy-4-methyl-19-nor-9 $\beta$ -pregna-1, 3, 5 (10)-trien-11, 20-dione and 1, 9 $\beta$ , 17, 20 $\beta$ , 21-pentahydroxy-4-methyl-19-nor-9 $\beta$ -pregna-1, 3, 5 (10)-trien-11-one obtained by microbial biotransformation of cortisone. *Sustainable Chemistry and Pharmacy*, 37, 101345.
26. Hassan, M. J. M., & Al-Rubaiawi, M. S. F. (2017). Cloud point extraction spectrophotometric method for determination of three types of cephalosporin via diazotization reactions with different reagents. *Br. J. Anal. Chem*, 4(17), 24-36.
27. Benkhaya, S., M'rabet, S., & El Harfi, A. (2020). Classifications, properties, recent synthesis and applications of azo dyes. *Heliyon*, 6(1).
28. McCormack, A. T., & Stephens, J. C. (2024). The continuous flow synthesis of azos. *Journal of Flow Chemistry*, 14(2), 377-396.
29. Silva, J. A. D., Dias, R. P., Hora, G. C. D., Soares, T. A., & Meneghetti, M. R. (2018). Molecular dynamics simulations of cetyltrimethylammonium bromide (CTAB) micelles and their interactions with a gold surface in aqueous solution. *Journal of the Brazilian Chemical Society*, 29(1), 191-199.
30. Duraimurugan, D., Mathuri, L., Indulekha, J., Anantharaj, R., & Arunagiri, A. (2016). Performance evaluation of Tergitol NP-7 and Triton X-114 for the removal of crystal violet using cloud-point extraction. *Chemical and Biochemical Engineering Quarterly*, 30(2), 189-198.
31. Mortada, W. I., Hassanien, M. M., & El-Asmy, A. A. (2014). Cloud point extraction of some precious metals using Triton X-114 and a thioamide derivative with a salting-out effect. *Egyptian Journal of Basic and Applied Sciences*, 1(3-4), 184-191.
32. Rub, M. A., Hoque, M. A., Azum, N., & Mahbub, S. (2022). Investigation of the aggregation, clouding and thermodynamics of the mixture of sodium alginate with sodium dodecyl sulfate and triton X-100 in aqueous and aqua-organic mixed solvents media. *Journal of Molecular Liquids*, 346, 117109.
33. Abbas, R. F., Hassan, M. J. M., & Rheima, A. M. (2025). Determination of AY 23 dye using magnetic solid-phase extraction coupled with spectrophotometry: application of greenness and blueness assessment tools. *Green Analytical Chemistry*, 12, 100179.
34. Abbas, R. F., Hassan, M. J. M., & Rheima, A. M. (2023). Magnetic solid-phase extraction of Fast Green dye based on magnetic nanoparticles (GO/Co<sub>3</sub>O<sub>4</sub>/Fe<sub>3</sub>O<sub>4</sub>) prepared by photo-irradiation method. *Green Analytical Chemistry*, 7, 100086.
35. Manousi, N., Wojnowski, W., Płotka-Wasyłka, J., & Samanidou, V. (2023). Blue applicability grade index (BAGI) and software: a new tool for the evaluation of method practicality. *Green chemistry*, 25(19), 7598-7604.
36. Mansour, F. R., Bedair, A., & Locatelli, M. (2025). Click analytical chemistry index as a novel concept and framework, supported with open source software to assess analytical methods. *Advances in Sample Preparation*, 14, 100164.
37. Pena-Pereira, F., Wojnowski, W., & Tobiszewski, M. (2020). AGREE—Analytical GREENness metric approach and software. *Analytical chemistry*, 92(14), 10076-10082.
38. sabbar Fali, M., Abbas, R. F., Mahdi, N. I., Abood, N. K., & Hassan, M. J. M. (2023). FIA-spectrophotometric method for the determination of amoxicillin in pharmaceuticals; application of AES, GAPI, and AGREE greenness assessment tools. *MethodsX*, 11, 102437.
39. Abbas, R. F., Mahmoud Hussain, A., Sabbar Fali, M., Hassan, M. J. M., Mahdi, N. I., & Ahmed, H. M. (2025). Spectrophotometric determination and removal of Rhodamine 6G from aqueous solutions using unfunctionalized multi-walled carbon nanotubes; with greenness and blueness assessment. *International Journal of Environmental Analytical Chemistry*, 1-23.