

EXTRACTION OF VITAMIN B12 FROM AQUEOUS SOLUTION BY USING SOLID-LIQUID EXTRACTION AND ULTRA SONIC FREQUENCY

SHAYMAA I SAEED

References:

1. Lyon, P.; Strippoli, V.; Fang, B.; Cimmino, L. B Vitamins and One-Carbon Metabolism: Implications in Human Health and Disease. *Nutrients* 2020, 12 (9), 1–24.
2. Layden, A. J.; Täse, K.; Finkelstein, J. L. Neglected Tropical Diseases and Vitamin B12: A Review of the Current Evidence. *Trans. R. Soc. Trop. Med. Hyg.* 2018, 112 (10), 423–435.
3. Fritz, J.; et al. A Systematic Review of Micronutrient Deficiencies in Pediatric Inflammatory Bowel Disease. *Inflamm. Bowel Dis.* 2019, 25 (3), 445–459.
4. Mathew, A. R.; Schwenkenbecher, P.; Suhs, K.-W.; Raab, P.; Stangel, M.; Skripuletz, T. Vitamin B12 Deficiency and the Nervous System: Beyond Metabolic Decompensation—Comparing Biological Models and Gaining New Insights into Molecular and Cellular Mechanisms. *Int. J. Mol. Sci.* 2024, 25 (1).
5. Doets, E. L.; In 't Veld, P. H.; Szczecińska, A.; Dhonukshe-Rutten, R. A.; Cavelaars, A. E.; van 't Veer, P.; Brzozowska, A.; de Groot, L. C. Systematic Review on Daily Vitamin B12 Losses and Bioavailability for Deriving Recommendations on Vitamin B12 Intake with the Factorial Approach. *Ann. Nutr. Metab.* 2013, 62 (4), 311–322.
6. Andrès, E.; Zulfikar, A. A.; Serraj, K.; Vogel, T.; Kaltenbach, G. Systematic Review and Pragmatic Clinical Approach to Oral and Nasal Vitamin B12 (Cobalamin) Treatment in Patients with Vitamin B12 Deficiency Related to Gastrointestinal Disorders. *J. Clin. Med.* 2018, 7 (10), 1–13.
7. Elsupikhe, R. F.; Shamel, K.; Ahmad, M. B.; Ibrahim, N. A.; Zainudin, N. Green Sonochemical Synthesis of Silver Nanoparticles at Varying Concentrations of κ -Carrageenan. *Nanoscale Res. Lett.* 2015, 10 (1), 1–8.
8. Martínez, R. F.; Cravotto, G.; Cintas, P. Organic Sonochemistry: A Chemist's Timely Perspective on Mechanisms and Reactivity. *J. Org. Chem.* 2021, 86 (20), 13833–13856.
9. Dheyab, M. A.; Aziz, A. A.; Jameel, M. S. Recent Advances in Inorganic Nanomaterials Synthesis Using Sonochemistry: A Comprehensive Review on Iron Oxide, Gold and Iron Oxide Coated Gold Nanoparticles. *Molecules* 2021, 26 (9).
10. Li, Z.; et al. A Power-Triggered Preparation Strategy of Nano-Structured Inorganics: Sonosynthesis. *Nanoscale Adv.* 2021, 3 (9), 2423–2447.
11. Yusof, N. S. M.; Babgi, B.; Alghamdi, Y.; Aksu, M.; Madhavan, J.; Ashokkumar, M. Physical and Chemical Effects of Acoustic Cavitation in Selected Ultrasonic Cleaning Applications. *Ultrason. Sonochem.* 2016, 29, 568–576.
12. Karthikesh, M. S.; Yang, X. The Effect of Ultrasound Cavitation on Endothelial Cells. *Exp. Biol. Med.* 2021, 246 (7), 758–770.
13. Li, J.; Zeng, H.; Zeng, Z.; Zeng, Y.; Xie, T. Promising Graphene-Based Nanomaterials and Their Biomedical Applications and Potential Risks: A Comprehensive Review. *ACS Biomater. Sci. Eng.* 2021, 7 (12), 5363–5396.
14. Adetayo, A.; Runsewe, D. Synthesis and Fabrication of Graphene and Graphene Oxide: A Review. *Open J. Compos. Mater.* 2019, 9 (2), 207–229.
15. Guo, S.; Garaj, S.; Bianco, A.; Ménard-Moyon, C. Controlling Covalent Chemistry on Graphene Oxide. *Nat. Rev. Phys.* 2022, 4 (4), 247–262.
16. Liu, D.; Bian, Q.; Li, Y.; Wang, Y.; Xiang, A.; Tian, H. Effect of Oxidation Degrees of Graphene Oxide on the Structure and Properties of Poly(vinyl alcohol) Composite Films. *Compos. Sci. Technol.* 2016, 129, 146–152.
17. Roshchina, T. M.; Glazkova, S. V.; Khrycheva, A. D.; Makotchenko, V. G.; Pantyukhin, M. L. Effect of Fluorination on the Surface Properties of Carbon Materials as Probed by Gas Chromatography. *Moscow Univ. Chem. Bull.* 2007, 62 (2), 67–71.
18. Chronopoulos, D. D.; Bakandritsos, A.; Pykal, M.; Zbořil, R.; Otyepka, M. Chemistry, Properties, and Applications of Fluorographene. *Appl. Mater. Today* 2017, 9, 60–70.
19. Giannetti, E. Thermal Stability and Bond Dissociation Energy of Fluorinated Polymers: A Critical Evaluation. *J. Fluor. Chem.* 2005, 126 (4), 623–630.
20. Bi, X.; et al. Fluorinated Graphene Prepared by Direct Fluorination of N, O-Doped Graphene Aerogel at Different Temperatures for Lithium Primary Batteries. *Materials (Basel)* 2018, 11 (7), 1–11.
21. Hanoon, H. D.; Kowsari, E.; Abdouss, M.; Ghasemi, M. H.; Zandi, H. Highly Efficient and Simple Protocol for Synthesis of 2, 4, 5-Triarylimidazole Derivatives from Benzil Using Fluorinated Graphene

- Oxide as Effective and Reusable Catalyst. *Res. Chem. Intermed.* 2017, 43 (7), 4023–4041.
22. Li, M.; Zhang, X.; Wang, S.; Hu, X.; Zhao, Y.; Xie, J.; Xiong, Y.; Xu, K.; Cheng, F.; Chen, J. Relating Catalysis between Fuel Cell and Metal-Air Batteries. *Matter* 2020, 2 (1), 32–49.
23. L. Ed, E. X-ray Characterization of Materials; Wiley-VCH: New York, 2003.
24. Chen, J.; Yan, W. Q.; Lam, C. M.; Zeng, C. C.; Hu, L. M.; Little, R. D. Electrocatalytic Aziridination of Alkenes Mediated by n-Bu₄NI: A Radical Pathway. *Org. Lett.* 2015, 17 (4), 986–989.
25. Huseynov, E.; Garibov, A.; Mehdiyeva, R. TEM and SEM Study of Nano SiO₂ Particles Exposed to Influence of Neutron Flux. *J. Mater. Res. Technol.* 2016, 5 (3), 213–218.