



“Gheorghe Asachi” Technical University of Iasi, Romania



APPLICATIONS OF ADSORPTION ONTO DOWEX-MARATHON ANIONIC RESIN: A REVIEW

Cristina Marcu*, Anuța Balla, Jozsef Zsolt Szűcs-Balázs

National Institute for Research and Development of Isotopic and Molecular Technologies, Cluj- Napoca 400293, Romania

Abstract

Dowex-Marathon MSA is a commercial macroporous strong-base anionic exchange resin composed of a styrene–divinylbenzene matrix and quaternary amine functional groups. This review provides a comprehensive overview of the practical applications of this versatile resin, examining both its basic form, as supplied by the manufacturer, and modified forms developed to enhance its performance. The paper synthesizes experimental results across a wide range of applications, including water and wastewater treatment, recovery of valuable ions and compounds, purification of chemical substances, and isotopic enrichment processes. Particular attention is given to the resin’s role in removing organic matter, heavy metals, silica, bromide, nitrites, and other pollutants from aqueous media, underlining its efficiency in addressing environmental challenges. Recovery processes such as the separation of carboxylic acids, vanillin, citric and lactic acids, as well as precious and rare metals like palladium and gold, are highlighted, demonstrating the resin’s potential for resource recovery and circular economy practices. Furthermore, studies on isotope enrichment, particularly for uranium and molybdenum, underscore its applicability in nuclear and industrial fields. The review also covers modified forms of Dowex-Marathon resin, such as those embedded with zirconium molybdate or iron oxide nanoparticles, which exhibit significantly enhanced adsorption capacities and selectivity for contaminants like arsenic and phosphate. Overall, this paper aims to support researchers and practitioners seeking an accessible, cost-effective, and efficient adsorbent material. Dowex-Marathon MSA stands out as a readily available resin that combines affordability, versatility, and reliable performance, positioning it as a valuable tool for environmental protection, health-related applications, and sustainable resource management..

Key words: adsorption, anion exchange resin, Dowex-Marathon MSA, environment, health

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* Author to whom all correspondence should be addressed: e-mail: cristina.marcu@itim-cj.ro; Phone: +40 0264584037; Fax: +40 264420042