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## A SYSTEMATIC REVIEW OF STUDIES EXAMINING CHEMISTRY TEACHERS' KNOWLEDGE OF GREEN CHEMISTRY: GLOBAL EVIDENCE (2020–2025)

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### ABSTRACT

This systematic review synthesised global empirical research published between 2020 and 2025 on chemistry teachers' knowledge of green chemistry. Comprehensive searches were conducted in ERIC, Google Scholar, ResearchGate and ScienceDirect using predefined keywords related to chemistry teachers' knowledge of green chemistry. Eligible studies were those that empirically assessed green chemistry knowledge among pre-service or in-service chemistry teachers. A multi-stage screening process encompassing title and abstract screening, full-text evaluation, and methodological appraisal, guiding the selection of studies. Extracted data covered study characteristics, sampling approaches, instruments, knowledge indicators, and key outcomes. A total of seven empirical studies met the eligibility criteria, representing regions across West Africa, Asia and the Middle East. The findings revealed considerable variation in teachers' knowledge levels across countries and teacher groups. Overall, pre-service chemistry teachers consistently demonstrated low levels of green chemistry knowledge, whereas in-service teachers frequently exhibited moderate to high knowledge, particularly those with many years of teaching experience. Several studies also highlighted a content–pedagogy imbalance, whereby teachers expressed confidence in teaching green chemistry despite demonstrating limited conceptual mastery. Contextual factors such as access to laboratory resources, exposure to professional development, and curricular integration further shaped knowledge outcomes across settings. The study highlights the urgent need to systematically embed green chemistry principles into pre-service teacher education, enhance continuous professional development for in-service teachers, and ensure the availability of sufficient laboratory resources.

**Keywords:** Green chemistry, knowledge, chemistry teacher, chemistry education, sustainability.