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Status of emerging DBPs in drinking water and their remediation techniques: A review

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Disinfection practices in water treatment plants have successfully curbed waterborne diseases, such as cholera, typhoid, etc. However, an inevitable consequence of disinfection is the formation of pollutants known as disinfection byproducts (DBPs). These emerging contaminants are potential carcinogens formed by the reaction of disinfectants with natural organic matter (NOM) and inorganic ions, such as iodides and bromides, present in water. Over 700 DBPs have been identified in drinking water, among which only trihalomethanes, haloacetic acids, chlorate, and bromate have been regulated. Toxicological studies have demonstrated that iodinated DBPs (I-DBPs) and nitrogenous DBPs (N-DBPs) are more cytotoxic and mutagenic than regulated ones. Hence, a gradual shift in the interest of researchers toward these unregulated DBPs has been observed. The remediation of DBPs involves a twofold approach: (i) the reduction of its precursors, i.e., NOM and inorganic ions, prior to disinfection, and (ii) the removal of DBPs post-disinfection. Conventional water treatment plants do not target the elimination of these precursors, thereby evoking the need for employing other techniques. Although numerous research has demonstrated different removal technologies for the reduction of DBPs and their precursor, the implementation of those technologies in the field is rarely observed. The significance of the present study lies in bridging this research gap. The study provides insights into the formation mechanism, global occurrence, and fate of different DBPs in drinking water. Furthermore, a comparative study on various techniques for the control and remediation of the emerging DBPs and their precursors, with a special emphasis on the pilot and full-scale studies, has also been discussed. Overall, the present study is conducive in obtaining on-shelf information on the status of DBPs globally in terms of their formation, fate, occurrence, and remediation.