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Removal of radio *N*-nitrosodimethylamine (NDMA) from drinking water by coagulation and Powdered Activated Carbon (PAC) adsorption

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Abstract. The presence of *N*-nitrosodimethylamine (NDMA) in drinking water supplies has raised concern over its removal by common drinking water treatment processes. However, only limited studies have been examined to evaluate the potential removal of NDMA by numerous water treatment technologies within a realistic range (i.e., sub µg/L) of NDMA levels in natural water due to analytical availability. In this study, a simple detection method based on scintillation spectroscopy has been used to quantify the concentration of ^{14}C-labeled NDMA at various ratios of sample to scintillation liquid. Without sample pretreatment, the method detection limits are 0.91, 0.98, 1.23, and 1.45 ng/L of NDMA at scintillation intensity ratios of 10:10, 5:15, 15:5, and 2.5:17.5 (sample: scintillation liquid), respectively. The scintillation intensity in all cases is linear (R^2>0.99) and is in the range of 0 to 100 ng/L of NDMA. In addition, because scintillation intensity is independent of solution pH, conductivity, and background electrolyte ion types, a separate calibration curve is unnecessary for NDMA samples at different solution conditions. Bench-scale experiments were performed to simulate individual treatment processes, which include coagulation and adsorption by powdered activated carbon (PAC), as used in a drinking water treatment plant, and biosorption, a technique used in biological treatment of waste water. The results show that coagulation and biosorption may not be appropriate mechanisms to remove NDMA (i.e., hydrophilic based on its low octanol-water partitioning coefficient, Log K_{ow}=0.57). However, relatively high removal of NDMA (approximately 50%) was obtained by PAC at high PAC dosages and longer contact times.

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