

# 5-Bromo-Ph4-BTPPhen Ligand for Selective Removal of Strontium and Cobalt From Water

Jiseon Jang<sup>a</sup>, Laurence M. Harwood<sup>b\*</sup>, Joe Cowell<sup>b</sup>, Ashfaq Afsar<sup>b</sup>, and Dae Sung Lee<sup>a\*</sup>

<sup>a</sup>Department of Environmental Engineering, Kyungpook National University, 80 Daehak-ro, Buk-gu, Daegu, Republic of Korea

<sup>b</sup>Department of Chemistry, University of Reading, Whiteknights, Reading RG6 6AD, United Kingdom  
daesung@knu.ac.kr

## Abstract

In this study, 5-bromo-2,9-bis(5,6-diphenyl-1,2,4-triazin-3-yl)-1,10-phenanthroline (5-bromo-Ph4-BTPPhen) was synthesized and evaluated for its ability to remove major radionuclides ( $\text{Cs}^+$ ,  $\text{Sr}^{2+}$ , and  $\text{Co}^{2+}$ ). The synthesized ligand removed both  $\text{Sr}^{2+}$  and  $\text{Co}^{2+}$  from  $1 \text{ mg L}^{-1}$  aqueous solutions with extraction efficiencies of up to 99% at neutral and alkaline pH. The  $\text{Sr}^{2+}$  and  $\text{Co}^{2+}$  removal efficiencies decreased as a consequence of the higher bonding strengths of competing metal ions to the N-donor atoms in the cavity of the ligand; competing divalent ions affected the  $\text{Sr}^{2+}$  and  $\text{Co}^{2+}$  removal efficiencies more than monovalent ions.

Keywords: BTPPhen, radioactive wastewater, distribution coefficient, radionuclides, ligand