

## Impregnation of Insoluble Cobalt Ferrocyanide onto Anion-Exchange Graft Chain Appended to Nylon Fiber

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### Summary

Radioactive substances such as cesium-137 and strontium-90 were released to the environment by the Fukushima Daiichi Nuclear Power Plant of TEPCO, which was damaged by the East Japan Earthquake with a magnitude of 9.0. Some of the cesium-137 and strontium-90 were transported into the surface water such as rivers, lakes, and seawater, to be dissolved as  $\text{Cs}^+$  or  $\text{Sr}^{2+}$  at extremely low concentrations. Water contaminated with radioactive cesium ions, which is being produced during the decontamination operation, is currently stored temporarily in tanks.

The mechanism of the impregnation of insoluble cobalt ferrocyanide onto an anion-exchange fiber was clarified. Vinyl benzyl trimethylammonium chloride and *N*-vinyl pyrrolidone were cografter-polymerized onto a 6-nylon fiber with an average diameter of 40  $\mu\text{m}$  to obtain an anion-exchange group density of 0.61 mmol/g. Ferrocyanide ions were adsorbed onto the anion-exchange fiber uniformly across the fiber. Subsequently, by immersing the fiber into cobalt chloride solution, ferrocyanide ions were quantitatively repelled by chloride ions to form a precipitate of cobalt ferrocyanide at the periphery of the fiber. No leakage of this precipitate to the external solution was detected. The impregnation percentage, defined as the mass content of the precipitate in the anion-exchange fiber, was 6.6%.