

In the Lab

Uranium Capture From High Sulfate and Nitrate Waste Streams with Modified Silica Polyamine Composites

Johnson Matthey Technology Review features new laboratory research

Edward Rosenberg is a Professor of Chemistry at the University of Montana, USA. His research interests are in the areas of the applications of composite materials for metal ion removal, separation and concentration from aqueous systems.

About the Research

The objective of this research is to find a solid phase adsorbent that is selective for uranyl cation (UO_2^{2+}) in the types of waste streams found on the Navajo reservation in the southern part of the USA. The technology could potentially be used to remove this ion from ground and surface waters and to remove trace uranyl from drinking water supplies on the reservation.

There are several ion exchange materials on the market that report effective removal of uranium from water. Silica polyamine composites (SPC) are patented and commercialised ion exchange materials currently being developed for use in water remediation by Johnson Matthey Water Technologies division. SPC are made by the coating of amorphous silica gel particles with functionalised silane, which are further reacted with polymeric amines to provide the parent composites WP-1 and BP-1 (**Figure 1**).

The parent SPC can then be modified to make them more specific to a given metal or group of metals (**Figure 2**).

Preliminary results on the removal of uranyl cation from solutions that mimic the contamination profiles of waste streams on the Navajo reservation have been obtained using a range of SPC materials. The most effective SPC is then compared with a polystyrene material

About the Researcher



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with related functional groups using equilibrium batch studies. The results of this exciting work are expected to be submitted for publication shortly.

Much work remains to be done before the group can go forward to applying this technology to remediation on the Navajo reservation. Breakthrough studies are currently underway as well as more direct comparisons with other materials. Most importantly cycle testing must be done with actual waste stream samples from the

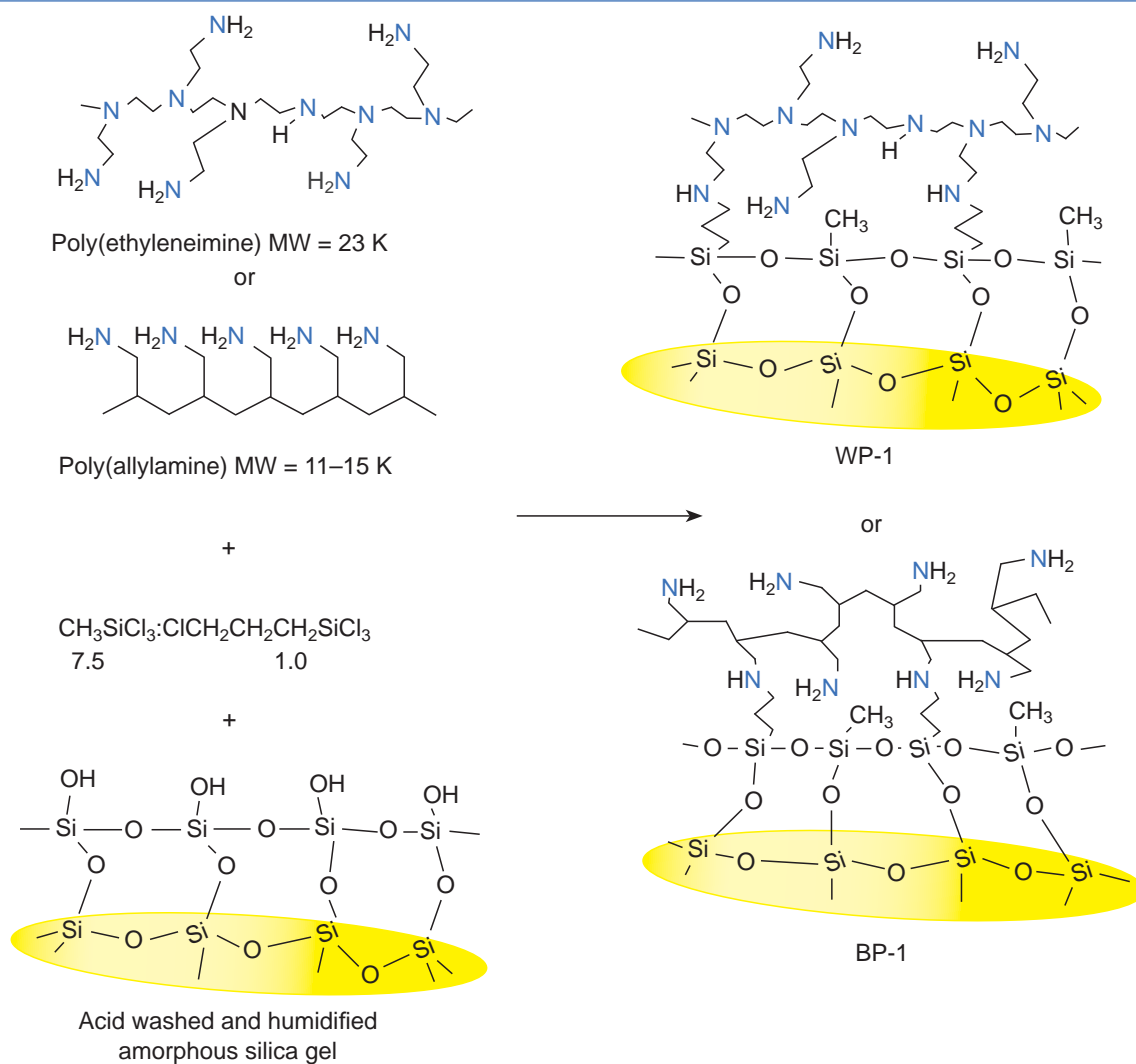


Fig. 1. Synthesis of the SPC materials

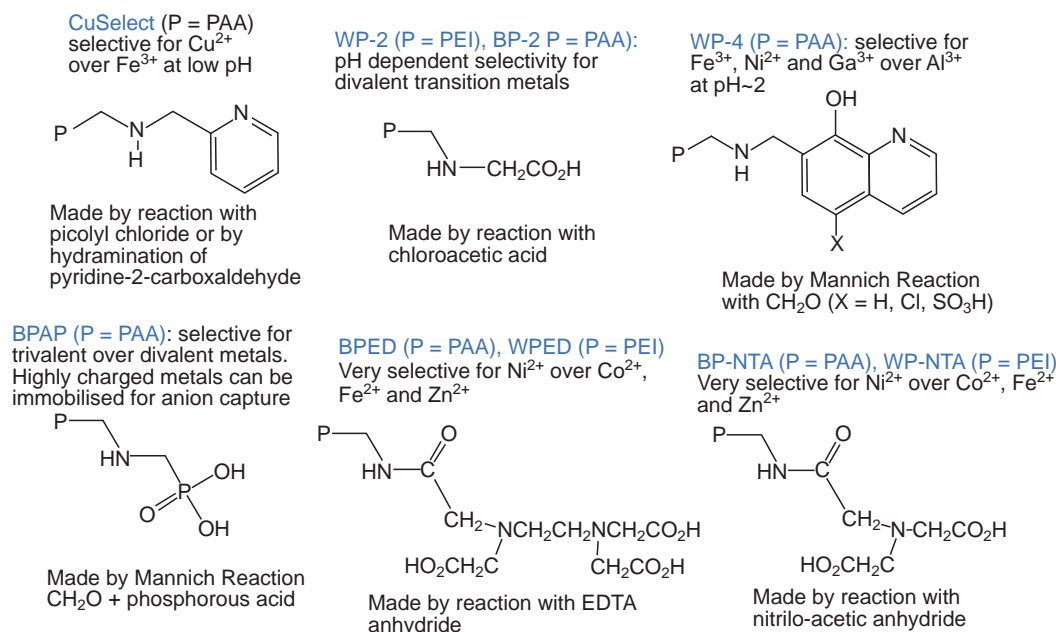


Fig. 2. Ligand modified SPC and their applications to date

reservation to evaluate the usable lifetime of the solid phase adsorbents under real working conditions. The results obtained to date are certainly worth following up with pilot scale runs as the next milestone.

Acknowledgements

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Selected Publications

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