TECHNETIUM FROM TWO PERSPECTIVES: SULFIDE REMEDIATION AND SCHIFF BASE CHEMISTRY

Kimberly Marie Reinig

Silvia S. Jurisson and Carol A. Deakyne, Dissertation Supervisors

ABSTRACT

Part I: Sulfide Remediation

Technetium-99 is an environmental concern due to waste leakage at nuclear storage facilities. Due to this high mobility in water and its long half-life, studies have been done to understand the environmental impact of technetium and to prevent further contamination issues.

The H_2S gaseous diffusion method has shown potential in immobilizing technetium by forming reduced Tc solids in the ground. One objective of this project was to identify the complexes formed during interferences of the H_2S diffusion method. Additionally, work has been done to investigate the interaction of sulfide and pertechnetate with common Fe-containing minerals.

Part II: Schiff Base Chemistry

Technetium-99m Schiff base complexes have been studied for use as single photon emission computed tomography (SPECT) imaging agents. Rhenium is often considered a structural analog to technetium and has isotopes ideal for radiotherapy and imaging.

Many Tc and Re N_2O_2 Schiff base complexes have been investigated. In previous work, addition of thiocyanate (NCS^-) to *trans*-[ReO(X)($acac_2$en/pn)] (X = OH_2 or Cl^-) led to the formation of *cis*-[ReO(NCS)$acac_2$en/pn]. Efforts to understand and develop suitable Tc/Re radiopharmaceuticals have led to unusually aqueous-stable $M^VO(NCS)$ Schiff base complexes.