FC 1.3: Waste Form Development and Off-Gas Capture: 1.3b: Iodine Capture from Highly Oxidizing Off-Gas Streams

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Iodine Capture from Highly Oxidizing Off-Gas Streams

• US regulations require removal of iodine and tritium from the off-gas stream from UNF recycling facility

• Advanced tritium pretreatment uses high concentrations of NO2 to volatilize tritium and iodine from oxidized UNF prior to dissolution. High concentrations of NO2 can reduce the iodine loading capacity of Ag0 Z by > 90% when exposed for 1 week
  - Gaseous effluent requires tritium and iodine capture
  - High levels of NO2 could have a detrimental effect sorbents.
    - Iodine sorbents: reduced silver mordenite (Ag0 Z), silver-functionalized silica-aerogel (AgAerogel), silver-nitrate-impregnated alumina (AgA).
    - Iodine capture tests in a recirculating high NO2 system indicated only limited recovery with the iodine depositing elsewhere in the system.
Iodine Capture from Highly Oxidizing Off-Gas Streams

- The focus of this research effort is the development of a robust iodine sorbent for use in this highly oxidizing environment.

- Characteristics of a suitable sorbent material include rapid adsorption kinetics, high iodine loading (> 5-10% by weight), low cost, very high iodine retention once loaded, high radiation stability, and producible in a mechanically-robust, engineered form.

- The proposed iodine loaded sorbent material must also have a direct pathway to a suitable waste form for ultimate disposal in a deep geologic repository.
Material Recovery INL Areas of Interest

• Iodine Capture from Highly Oxidizing Off-Gas Streams
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