



Development of laboratory scale Rotary semi continuous dissolver for nuclear spent fuel reprocessing facilities.

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Design methodology

- Selection of suitable continuous dissolver equipment.
- Design and optimization of various parameters.
- Fabrication of dissolver models for lab-scale studies.
- Validation of Laboratory scale.

Selection of suitable dissolver equipment

- Ferris wheel type dissolver
- Spiral vibratory rotary drum continuous dissolver
- Compartmented rotary drum type semi continuous dissolver
- Pneumatic pulsed continuous dissolver
- Vibratory tray type continuous dissolver

Working Principle	
Mixing mode	Transfer Mode
<p>MIXING MODE</p>	<p>TRANSFER MODE</p>
<p>When dissolver is rotated in one direction the sheared fuel pieces are moving in one compartment only, and continuously get tumbled in dissolvent.</p>	<p>When Drum is rotated one revolution in reverse direction, all the pins are transferred to next stage through guided plate and oblique cone.</p>

optimization of design parameters



540mm ID Two-stage dissolver model with compartmented refill.

Set-up for Angle of repose and different parts of compartmented refill.

Fabrication of lab scale dissolver



5-stage 150mm ID Perspex made rotary continuous dissolver.

2-stage 150mm ID SS rotary semi continuous dissolver inside fume-hood.

Results and Conclusion

2 - stage 150mm ID SS rotary semi-continuous dissolver was used for complete dissolution of unirradiated UO₂ pellets in 8M boiling nitric acid at various speeds, without any mechanical failure. It was observed that rate of dissolution was mu faster in dynamic condition than static batch condition.