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

<table>
<thead>
<tr>
<th>Mixing mode</th>
<th>Transfer Mode</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="Mixing Mode" /></td>
<td><img src="image2.png" alt="Transfer Mode" /></td>
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</tbody>
</table>

When dissolver is rotated in one direction the sheared fuel pieces are moving in one compartment only, and continuously get tumbled in dissolvent.

When Drum is rotated one revolution in reverse direction, all the pins are transferred to next stage through guided plate and oblique cone.

optimization of design parameters

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 much faster in dynamic condition than static batch condition.