Polyether Product Recovery: Salt-Induced Water-Polymer Separation

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Evonik Industries supplies approximately 30 polyether products that are split into three main classes of molecular weight:

• Class I: < 1000 Da, Class II: 1000-2000 Da, Class III: > 3000 Da
• NaH$_2$PO$_4$ may be used to force the separation of polyether-water mixtures

Specific Goals

• Develop an industrially viable method to recover Evonik’s polyether product.
• Design a process which provides a one year payback period.
• Determine fast and reliable methods to quantify the composition of wastewater.
• Perform a bench scale Design of Experiment to explore the effects of temperature and salt concentrations on polyether recovery.
• Complete a scale up on the optimized conditions for the major products.

Quantitative Analysis

Refractive index and thermogravimetric analysis were the best available methods to quantify the concentrations of polymer and NaH$_2$PO$_4$ in the treated and untreated wastewater. Three classes of waste water were treated with salt and the percentage of polyether recovered was quantified after testing. The effects of salt concentration and temperature on percent recovery were investigated. Prior knowledge was used to set the DOE parameters.

<table>
<thead>
<tr>
<th>Classes 1 and 2</th>
<th>Class 3</th>
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<tbody>
<tr>
<td>DOE Parameter</td>
<td></td>
</tr>
<tr>
<td>Salt Percentage (g/100g)</td>
<td>Min</td>
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<tr>
<td>Temperature (°C)</td>
<td>20</td>
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<td>20</td>
<td>40</td>
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References