optical purity of a mixture of enantiomers = \( \frac{[\alpha]_{\text{mixture}}}{[\alpha]_{\text{major enantiomer when pure}}} \times 100 \)

\([\alpha]_{\text{mixture}} = \text{specific rotation of the mixture} \)

\([\alpha]_{\text{major enantiomer when pure}} = \text{specific rotation of the major enantiomer when pure} \)

eg:

Hypothetical compounds (+)-A and (-)-A are enantiomers.

<table>
<thead>
<tr>
<th>enantiomer</th>
<th>([\alpha] ) in water</th>
</tr>
</thead>
<tbody>
<tr>
<td>(+)-A</td>
<td>+45</td>
</tr>
<tr>
<td>(-)-A</td>
<td>-45</td>
</tr>
</tbody>
</table>

Consider a mixture of (+)-A and (-)-A whose \([\alpha] \) in water is -35. The fact that the specific rotation of the mixture is negative means that the major enantiomer of the mixture is (-)-A.

\[
\text{optical purity of the mixture} = \frac{-35}{-45} \times 100
\]
\[
= 77.78\%
\]

Optical purity of a mixture of enantiomers is numerically equal to its enantiomeric excess.

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**Contributors**

- Gamini Gunawardena from the OChemPal site (Utah Valley University)