Hydroquinone in Sound Track Developer
ECP-2-407

<table>
<thead>
<tr>
<th>Process</th>
<th>ECN-2</th>
<th>ECP-2D</th>
<th>VNF-1/LC</th>
<th>RVNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulas</td>
<td>—</td>
<td>SD-43b</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

INTRODUCTION
A phosphate buffer is added to the sample to control its pH. Then the hydroquinone (HQ) is extracted with ethyl acetate. Alcohol and sulfuric acid are added to the ethyl acetate layer to effect a single-phase system. This solution is then titrated with sulfato cerate. The end of the titration is detected by the change in color from orange or light green or colorless.

This method requires handling potentially hazardous chemicals. Consult the Material Safety Data Sheet for each chemical before use. MSDS's are available from your chemical supplier.

SPECIAL APPARATUS
• 50-mL Buret (offset-tip)
• 5-mL Syringe

Note: Use pipets and volumetric glassware meeting the “Class A” definition by the National Institute of Standards and Technology (NIST).

REAGENTS
Use ACS Reagent Grade reagents unless specified otherwise.
• Potassium Monohydrogen/Dihydrogen Phosphate Buffer, pH 7.9 at 27°C (80.6°F).
• Ethyl Acetate, water saturated
• 7.0 N Sulfuric Acid, H₂SO₄
• Ferroin Indicator
• Methyl Alcohol, CH₃OH
• 0.05 N Sulfato Cerate (standardized to 4 decimal places)

PROCEDURE

Extraction of Hydroquinone
1. Add 25 mL of potassium monohydrogen/dihydrogen phosphate buffer, pH 7.9, from a tip-up pipet, to a 250-mL separatory funnel No. 1.
2. Using a 5-mL syringe, add 2.00 mL of sample to funnel No. 1.
3. Add, from a tip-up pipes, 50 mL of water-saturated ethyl acetate to funnel No. 1.
4. Shake the separatory funnel briskly for 15 seconds; then allow the layers to separate (30 seconds or more).
5. Transfer as completely as possible the bottom (water) layer to separatory funnel No. 2 without losing any of the top layer containing HQ.
6. Add, from a tip-up pipet, 50 mL of water-saturated ethyl acetate to funnel No. 2.
7. Shake funnel No. 2 briskly for 15 seconds; then allow the layers to separate (30 seconds or more).
8. Discard the bottom layer. (A small amount of the bottom layer may be left in the funnel.)
9. Transfer the contents of funnel No. 2 to separatory funnel No. 1.
10. Add 10 m L of potassium monohydrogen /dihydrogen phosphate buffer, pH 7.9, from a tip-up pipet.
11. Shake briskly for 10 seconds and allow the layers to separate.
12. Discard as completely as possible the bottom layer without losing any of the top layer containing HQ.

Preparation of the Top Layer for Titration of HQ
1. Add, from a tip-up pipet, 50 mL of methyl alcohol and 50 mL of 7.0 N sulfuric acid to a 400-mL beaker.
2. Transfer the top layer to the 400-mL beaker.
3. Add three drops of Ferroin indicator.

Absorbance Measurements
1. Place the beaker on a magnetic stirrer and stir at a moderate rate. (Be careful to keep the sample from splashing.)
2. Immerse the tip of the buret into the sample, and titrate with standardized 0.05 N sulfato cerate at a moderate rate.
3. When near the end point, withdraw the tip of the buret from the solution, and reduce the rate of delivery to about three drops a second. Titrate to the first light green color that persists for 15 seconds.

Calculations

\[
HQ, \text{ g/L} = \frac{(N \text{ cerate})(mL \text{ cerate} - \text{blank})(\text{eq wt of HQ})(1000)}{(mL \text{ sample})(1000)}
\]

\[
HQ, \text{ g/L} = \frac{(N \text{ cerate})(mL \text{ cerate} - 0.27)(55.0)(1000)}{(2.00)(1000)}
\]

\[
27.5(N \text{ cerate})(mL \text{ cerate} - 0.27)
\]