Acceptance criteria: See Table 1.

### Table 1

<table>
<thead>
<tr>
<th>Name</th>
<th>Relative Retention Time</th>
<th>Relative Response Factor</th>
<th>Acceptance Criteria, NMT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancuronium bromide</td>
<td>0.5</td>
<td>1.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Vecuronium bromide related compound F</td>
<td>0.6</td>
<td>1.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Vecuronium bromide related compound C</td>
<td>0.9</td>
<td>1.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Vecuronium bromide</td>
<td>1.0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Vecuronium bromide related compound A</td>
<td>1.8</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Vecuronium bromide related compound B</td>
<td>2.2</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Any other individual unidentified impurity</td>
<td>—</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Total impurities</td>
<td>—</td>
<td>—</td>
<td>1.0</td>
</tr>
</tbody>
</table>

* 3-Deacetyl vecuronium bromide; piperidinium, 1-[(2\(\beta\),3\(\alpha\),5\(\alpha\),16\(\beta\),17\(\beta\)-17-acetoxy-3-hydroxy-2-(1-piperidinyl) androstan-16-yl]-1-methyl bromide.
* 3,17-bis Deacetyl vecuronium bromide; piperidinium, 1-[(2\(\beta\),3\(\alpha\),5\(\alpha\),16\(\beta\),17\(\beta\)-3,17-dihydroxy-2-(1-piperidinyl) androstan-16-yl]-1-methyl bromide.
* Dipiperidinol diacetate; 3\(\alpha\),17\(\beta\)-diacetyl-oxo-2\(\beta\),16\(\beta\)-bis(piperidinyl)-5\(\alpha\)-androstan.
* 17-Deacetyl vecuronium bromide; piperidinium, 1-[(2\(\beta\),3\(\alpha\),5\(\alpha\),16\(\beta\),17\(\beta\)-3-acetoxy-17-hydroxy-2-(1-piperidinyl) androstan-16-yl]-1-methyl bromide.

### SPECIFIC TESTS

- **Optical Rotation, Specific Rotation (7815)**
  - Sample solution: 10 mg/mL in dehydrated alcohol
  - Acceptance criteria: -16° to -20° at 20°
- **Bacterial Endotoxin Test (85):** NMT 10 USP Endotoxin Units/mg of vecuronium bromide
- **Loss on Drying (731):** Dry a sample at 105° for 2 h; it loses NMT 2.5% of its weight.

### ADDITIONAL REQUIREMENTS

- **Packaging and Storage:** Preserve in tight containers, and store at room temperature.
- **USP Reference Standards (11)**
  - USP Endotoxin RS
  - USP Pancuronium Bromide RS 3\(\alpha\),17\(\beta\)-di-hydroxy-2\(\beta\),16\(\beta\)-dipiperidinyl-5\(\alpha\)-androstan, 3,17-diacetate, dimethobromide. C\(_{33}\)H\(_{60}\)Br\(_2\)N\(_2\)O\(_4\) 732.67
  - USP Vecuronium Bromide RS
  - USP Vecuronium Bromide Related Compound A RS 3\(\alpha\),17\(\beta\)-diacetyl-oxo-2\(\beta\),16\(\beta\)-bis(piperidinyl)-5\(\alpha\)-androstan. C\(_{32}\)H\(_{54}\)N\(_2\)O\(_4\) 542.79
  - USP Vecuronium Bromide Related Compound B RS Piperidinium, 1-[(2\(\beta\),3\(\alpha\),5\(\alpha\),16\(\beta\),17\(\beta\)-3-acetoxy-17-hydroxy-2-(1-piperidinyl) androstan-16-yl]-1-methyl bromide. C\(_{34}\)H\(_{58}\)Br\(_2\)N\(_2\)O\(_4\) 595.69
  - USP Vecuronium Bromide Related Compound C RS Piperidinium, 1-[(2\(\beta\),3\(\alpha\),5\(\alpha\),16\(\beta\),17\(\beta\)-3,17-dihydroxy-2-(1-piperidinyl) androstan-16-yl]-1-methyl bromide. C\(_{35}\)H\(_{60}\)Br\(_2\)N\(_2\)O\(_4\) 595.69

### Venlafaxine Hydrochloride

![Venlafaxine Hydrochloride](image)

C\(_{17}\)H\(_{22}\)NO\(_2\) · HCl 313.86
Cyclohexanone, 1-[2-(dimethylamino)-1-(4-methoxyphenyl) ethyl]-2-propanol, (+)-1-[6-(Dimethylamino)methyl]-p-methoxybenzylcyclohexanol hydrochloride [99300-78-4].

### Identification

Venlafaxine Hydrochloride contains NLT 98.0% and NMT 102.0% of C\(_{17}\)H\(_{22}\)NO\(_2\) · HCl, calculated on the dried basis.

### Assay

- **Procedure**
  - Solution A: Phosphoric acid and water (1:10)
  - Buffer: 3.4 g of monobasic potassium phosphate in 700 mL of water. Adjust with Solution A to a pH of 3.0.
  - Diluent: Acetonitrile and water (1:1)
  - Mobile phase: Acetonitrile and Buffer (3:7)
  - Standard solution: 0.04 mg/mL of USP Venlafaxine Hydrochloride RS in Diluent
  - Sample solution: 0.04 mg/mL of Venlafaxine Hydrochloride in Diluent

**Chromatographic system**

(See Chromatography (621), System Suitability.)

**Mode:** LC

**Detector:** UV 225 nm

**Column:** 4.6-mm × 25-cm; 5-µm packing L7

**Flow rate:** 1.5 mL/min

**Column temperature:** 30 ± 2°

**Injection size:** 20 µL

**Run time:** 2 times the retention time of the venlafaxine peak

**System suitability**

- **Sample:** Standard solution

**Suitability requirements**

- **Tailing factor:** NMT 2.0
- **Relative standard deviation:** NMT 2.0%

**Analysis**

**Samples:** Standard solution and Sample solution

Calculate the percentage of C\(_{17}\)H\(_{22}\)NO\(_2\) · HCl in the portion of Venlafaxine Hydrochloride taken:

\[
\text{Result} = \left( \frac{r_d}{r_S} \right) \times \left( \frac{C_d}{C_I} \right) \times 100
\]
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**PROCEDURE**

Organic Impurities

- **HEAVY METALS**, **RESIDUE ON IGNITION**

Inorganic Impurities

<table>
<thead>
<tr>
<th>Name</th>
<th>Relative Retention Time</th>
<th>Relative Response Factor</th>
<th>Acceptance Criteria, NMT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Didesmethyl venlafaxine</td>
<td>0.8</td>
<td>1.0</td>
<td>0.15</td>
</tr>
<tr>
<td>Venlafaxine related compound A</td>
<td>0.9</td>
<td>1.0</td>
<td>0.15</td>
</tr>
<tr>
<td>Venlafaxine</td>
<td>1.0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Deoxyvenlafaxine</td>
<td>3.1</td>
<td>0.75</td>
<td>0.15</td>
</tr>
<tr>
<td>Any unknown individual impurity</td>
<td>—</td>
<td>1.0</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Acceptance criteria:

- **Individual impurities**: See Impurity Table 1.
- **Total impurities**: NMT 0.5%

RESULTS

<table>
<thead>
<tr>
<th>Sample solution</th>
<th>Concentration of USP Venlafaxine Hydrochloride RS in 1 mL</th>
<th>Acceptance criteria, NMT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Didesmethyl venlafaxine</td>
<td>0.8 mg/mL</td>
<td>NMT 0.1%</td>
</tr>
<tr>
<td>Venlafaxine related compound A</td>
<td>0.9 mg/mL</td>
<td>NMT 0.1%</td>
</tr>
<tr>
<td>Venlafaxine</td>
<td>1.0 mg/mL</td>
<td>NMT 0.5%</td>
</tr>
<tr>
<td>Deoxyvenlafaxine</td>
<td>3.1 mg/mL</td>
<td>NMT 0.15%</td>
</tr>
<tr>
<td>Any unknown individual impurity</td>
<td>— mg/mL</td>
<td>NMT 1.0%</td>
</tr>
</tbody>
</table>

**SPECIFIC TESTS**

- **LOSS ON DRYING** (731): Dry a sample in vacuum at 105°C for 3 h: it loses NMT 0.5% of its weight.

**ADDITIONAL REQUIREMENTS**

- **PACKAGING AND STORAGE**: Preserve in well-closed containers and store at controlled room temperature.
- **USP REFERENCE STANDARDS** (11)
  - USP Venlafaxine Hydrochloride RS
  - USP Venlafaxine Related Compound A RS
  - 1-(1-(4-Methoxyphenyl)-2-((methylamino)ethyl)cyclohexanol.
  - C₁₇H₂₇NO₂ 263.38

**Venlafaxine Tablets**

**DEFINITION**

Venlafaxine Tablets contain NLT 90.0% and NMT 110.0% of the labeled amount of venlafaxine free base (C₁₇H₂₇NO₂).

**IDENTIFICATION**

- **A. ULTRAVIOLET ABSORPTION** (797U)
  - **Diluent**: Methanol and 0.1 N hydrochloric acid (4:1)
  - **Sample solution**: Dissolve a quantity of finely powdered Tablets, equivalent to 75 mg of venlafaxine, with 200 mL of Diluent, then sonicate for 30 min. Dilute with Diluent to 250 mL. Centrifuge a portion of the filtrate with Diluent to make an approximately 1-in-2.5 solution. Pass a portion through a suitable 0.45-μm membrane filter.
  - **Wavelength range**: 250–350 nm

- **B. The retention time of the major peak of the Sample solution corresponds to that of the Standard solution, as obtained in the test for Organic Impurities.**

**ASSAY**

- **PROCEDURE**
  - **Buffer**: 3.4 g of potassium dihydrogen phosphate in 700 mL of water. Add 5 mL of triethylamine, and adjust with phosphoric acid to a pH of 3.0.