TECHNICAL INFORMATION

Catalog Number: 156738, 156739
Tamoxifen

Structure:
Free Base

\[
\text{Free Base}
\]

\[
\text{Citrate Salt}
\]

**Molecular Formula**
Free Base: C_{26}H_{29}NO
Citrate Salt: C_{26}H_{29}NO·C_{6}H_{8}O_{7}

**Molecular Weight**
Free Base: 371.5
Citrate Salt: 563.6

**CAS #**
10540-29-1
54965-24-1

**Synonyms:** [Z]-1-[p-Dimethylaminoethoxyphenyl]-1,2-diphenyl-1-butene;
(Z)-2-[4-(1,2-Diphenyl-1-butenyl)phenoxy]-N,N-dimethylethanamine; ICI 47699; trans-Tamoxifen; Z-Tamoxifen;
(Z)-2-(p-(1,2-Diphenyl-1-butenyl)phenoxy)-N,N-dimethylethylamine; trans-1-(p-b-Dimethylaminoethoxyphenyl)-1,2-diphenylbut-1-ene citrate

**Physical Description:** White fine, crystalline powder

**pKa:** approximately 8.85; approximately 6.9 (in Triton® X-100)

**Stability:** Tamoxifen is hygroscopic at high relative humidities and is sensitive to UV light. It is recommended to store the products in the dark.

**Solubility:**

**Free Base:** Practically insoluble in water (< 0.01% @ 20°C); soluble in methanol, ethanol, 2-propanol, propylene glycol, chloroform (50 mg/ml - clear, colorless to faint yellow solution) or DMSO. Solutions are sensitive to UV light. Photolysis products are the E isomer and the phenanthrenes formed by cyclization of both isomers. Solutions in DMSO may be stable when stored at -20°C in the dark.

**Citrate Salt:** Soluble in methanol (50 mg/ml with heat) or ethanol (10 mg/ml with sonication); very slightly soluble in water (0.3 mg/L @ 20°C; the pH is approximately 3.0-3.5), 0.02 N HCl (0.2 mg/ml @ 37°C), acetone or chloroform. A 4.0 mM solution in DMSO can be prepared. Solutions are sensitive to UV light. Photolysis products are the E isomer and the phenanthrenes formed by cyclization of both isomers.

**Description:** Protein kinase C inhibitor (IC\textsubscript{50} = 50-200 uM depending on assay conditions in MCF-7 cells or IC\textsubscript{50} = 100 uM in rat brain). The PKC inhibition is also dependent on the phosphohlipid concentration. Also inhibits both calmodulin-dependent and calmodulin-independent Ca\textsuperscript{2+}, Mg\textsuperscript{2+}-ATPase. Induces apoptosis in human malignant glioma cell lines. Tamoxifen and its metabolite 4-hydroxytamoxifen are mixed estrogen agonists/antagonists.

Tamoxifen has been shown to protect bone from estrogen-deficiency bone loss and lower plasma cholesterol in the rat. A 10 uM solution has exhibited fungicidal activity (optimal pH 7.5) against yeast cells of \textit{C. albicans}. It has been implemented in liver carcinogenesis in rats. A possible mechanism for the DNA adduct formation leading to carcinogenesis was reported. 100 nM solutions combined with vinblastine are cytotoxic to both rat prostate adenocarcinoma cell line and human prostate cancer cells. Flow cytometric analysis of DNA content and BrdU (5-bromo-2'-deoxyuridine) labeling in MCF-7 (estrogen-responsive human clonal breast cancer cell line) cells have shown that the effect of tamoxifen on the growth of estrogen-dependent cells in culture
may be due to accumulation of cells in G1 phase (before onset of S-phase) and the exit of some cells from the cycling compartment in the cell cycle progress. The mechanism of tamoxifen action may involve interactions in the signaling transduction pathway; tamoxifen is a competitive inhibitor of calmodulin-stimulated phosphodiesterase activity; molecular interactions between tamoxifen and calmodulin were reported.

Other actions of tamoxifen are:

- Reduction of plasma levels of insulin-like growth factor;
- Induction of cells surrounding cancer cells to secrete transforming growth factor b;
- Inhibition of membrane lipid peroxidation probably by decreasing membrane fluidity.

### Availability:

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<th>Description</th>
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### References:

- Merck Index 12th Ed., No. 9216.