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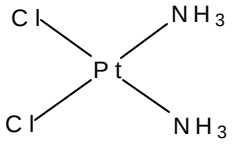
cis-Diammineplatinum(II) dichloride

Product Number **P4394**
Store at Room Temperature

CAS# 15663-27-1
Synonyms: Cisplatin; cis-DDP; CPDD; CDDP; NCI-C55776; Neoplatin; NK 801; NSC-119875; Peyrone's Chloride

Product Description



Appearance: Yellow to orange powder
Molecular Formula: $Pt(NH_3)_2Cl_2$
Molecular Weight: 300.0
Melting Point: 270 °C (decomposes)[1]
Extinction Coefficient: (0.1 N HCl):
At 203 nm, E^{mM} = 5.2 $mM^{-1}cm^{-1}$, $E^{1\%}$ = 173;
301 nm, E^{mM} = 0.130 $mM^{-1}cm^{-1}$, $E^{1\%}$ = 4.33;
362 nm, E^{mM} = 0.024 $mM^{-1}cm^{-1}$, $E^{1\%}$ = 0.806.[1]

A method of preparation and physical properties including the pK_a of several species of cisplatin in water,[2] the UV and visible spectra, HPLC methods, and mass spectra have been reported.[1]

Cisplatin is a platinum-containing, broad activity antineoplastic and alkylating agent effective against solid tumors of testes, ovaries, and bladder; epithelial malignancies; and cancers of the esophagus, lung, head, and neck.[1,3,4] Cisplatin is effective against sarcoma and leukemia in mice.[5] Cisplatin enters cells by diffusion. Its chloride is replaced with water forming the active, positively charged species, which may react with DNA to form intra (between N7 atoms of adjacent pairs) and interstrand crosslinks, thereby, inhibiting DNA replication.[4] Inhibition of the *Bam*H I cleavage and unwinding of pBR322 DNA by cisplatin was reported.[6]

Cisplatin (12.5 µM) binds to free sulfhydryl groups in tubulin and causes a partial depolymerization of microtubules.[7] It changes microtubule assembly by direct tubulin modification[8] and causes changes in the cytoskeletal pattern of tumor cells.[9] Cisplatin has induced apoptosis in cisplatin-sensitive and –resistant human ovarian cancer cells.[10,11] Cisplatin (5 mM) complexes with phosphatidylserine lipids in the membrane[12] and reportedly induces nephrotoxicity in the rat mainly by proximal tubular impairment.[13]

The mechanism of action,[4,14,15] pharmacokinetics,[3,16] and clinical and pharmacological properties[15,17] have been published. Cisplatin is a mutagenic and carcinogenic agent.[18,19]

Precautions and Disclaimer
This product is for laboratory research use only. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Storage/Stability
The product is soluble in water at 25 °C (0.253 g/100 g).[15] Apparent molar solubilities are:
in water (after 24 hours), 0.77 x 10^{-2}
in water (after 72 hours), 0.83 x 10^{-2}
and in 0.9% sodium chloride (after 72 hours), 0.50 x 10^{-2}.[1]
Cisplatin is insoluble in alcohol.[3] Apparent molar solubilities of cisplatin in other organic solvents are (at 25 °C):
Dimethylformamide (DMF) 6.67 x 10^{-2}
Dimethylacetamide (DMA) 6.00 x 10^{-2}
and Dimethyl sulfoxide (DMSO) 116.6 x 10^{-2}.[1]
Cisplatin is soluble in DMF (approximately 16.6 mg/ml) with gentle heating.

The cis-trans isomerization of cisplatin occurs in aqueous solution (in the absence of catalysts) and is increased at elevated temperatures.[15,20] The reversible substitution of water for chloride ions in cisplatin may be the primary reason for its decomposition in aqueous solutions.[3]

Even though cis-platin is soluble in DMSO, the use of DMSO to dissolve *cis*-- or *trans*-diamminedichloro-platinum (DDP) in biological studies is **strongly** discouraged. The DMSO inserts itself into the ligand.[27]

Stability of cisplatin in aqueous solutions was enhanced by increasing the sodium chloride (NaCl) concentration to 0.9% and was adversely affected in alkaline solutions such as sodium bicarbonate solutions.[3,21] A solution of cisplatin in 0.9% NaCl was stable for 24 hours (after an initial loss of 3% in less than one hour) at room temperature protected from the light.[3,22] The increased stability in NaCl solutions may be due to the availability of excess chloride ions.[3] Solutions of <0.6 mg/ml in NaCl should be stored at 2-8 °C and protected from light to avoid precipitation.[22] In addition to isotonic saline solution, cisplatin was stable in isotonic saline containing 5% dextrose in lactated Ringers solution.[21] A 0.1% solution in 0.9% sodium chloride solution has a pH range of 4.5-6.0 immediately after preparation.[3] It is recommended to prepare all solutions fresh and protect from light.

Cisplatin is stable in the presence of mannitol, glucose, benzyl alcohol, and parabens.[1,21,23] Cisplatin reacts with nucleophiles such as bisulfite (an antioxidant).[24,25] methionine, methionine containing peptides, and other compounds containing divalent sulfur.[1] Cisplatin (1 mg/ml) also reacts with aluminum producing a gas and black precipitate.[26]

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ARO/MAM 5/07