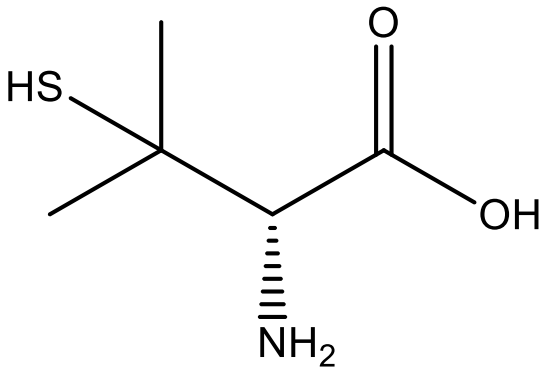
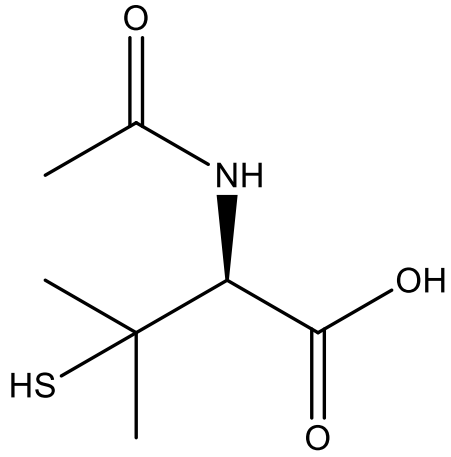


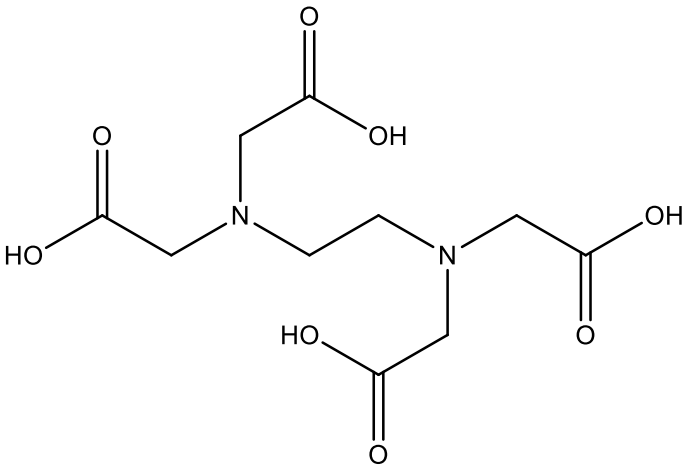
D-Penicillamine (DPA)



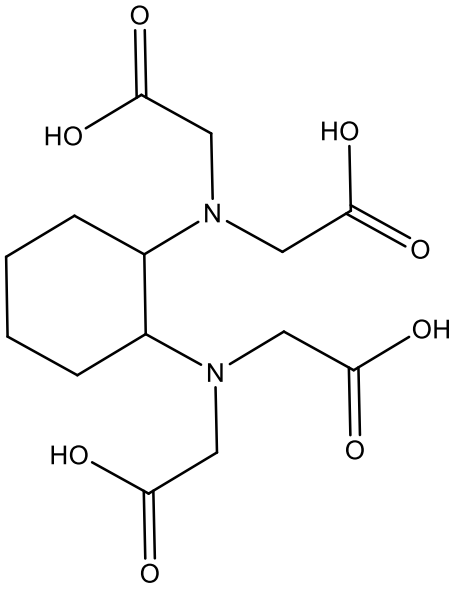
N-acetyl D-penicillamine (NAPA)

D-Penicillamine (DPA) or 3, 3′-dimethyl cysteine with binding sites containing N, S and O, can bind with CH_3Hg^+, Hg(II), Cu(II), Au(I), Pb(II) etc. In NAPA, acetyl group (Ac, $–COCH_3$) makes the chelating ligand more lipophilic.

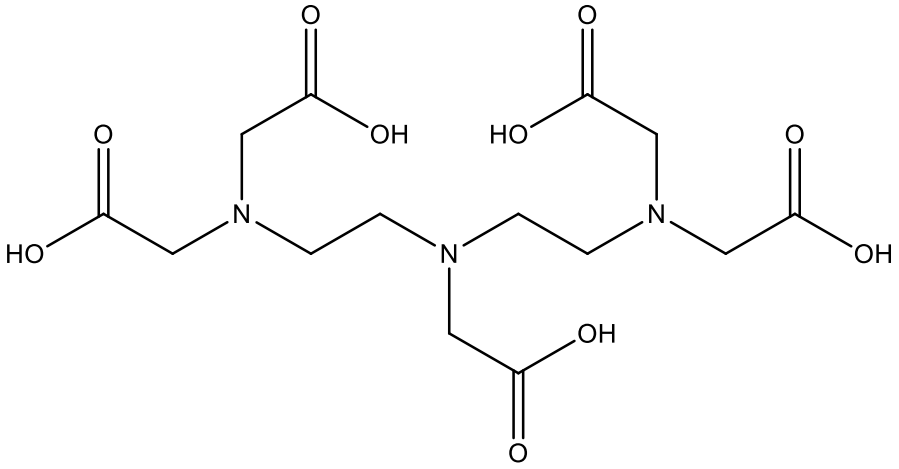
Polycarboxylic acid based chelating drugs



Ethylene diamine tetraacetic acid (EDTA)



Cyclohexane-1, 2-diaminetetraacetic acid (CDTA)



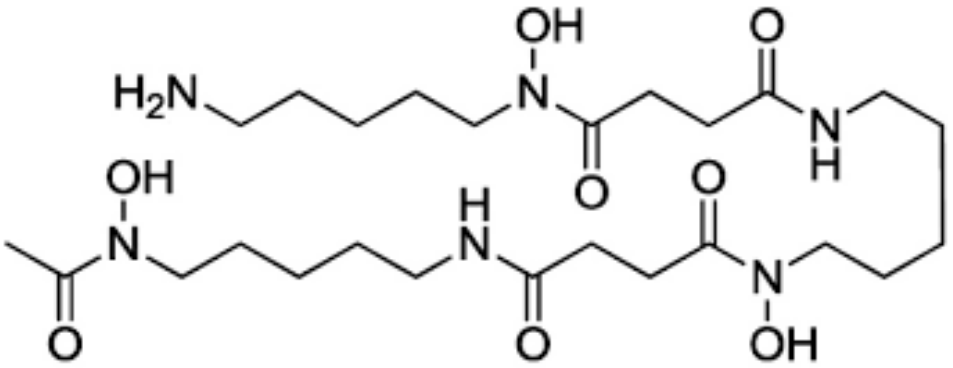
Diethylenetriaminepentaacetic acid (dtpa)

- Calcium salts are used intravenously or intramuscularly
- Polycarboxylic acid ligands forms strong complex with Ca(II) salts
- Na-salts causes calcium depletion
- Thus, to avoid depletion of Ca(II) or Zn(II) from human body, $Na_2Ca(edta)$ types of salts are used

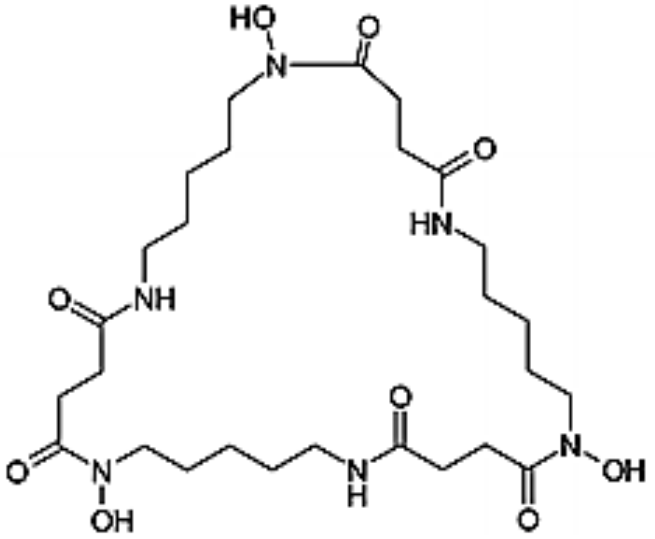
Deferoxamine (DFO), also known as desferrioxamine is a chelating ligand that binds iron and aluminium.

It is specifically used in iron overdose, hemochromatosis either due to multiple blood transfusions or an underlying genetic condition, and aluminium toxicity in people on dialysis.

It is used by injection into a muscle, vein, or under the skin.



Desferroxamine B



Desferroxamine E

Rheumatoid arthritis (RA) is an autoimmune disease that can cause joint pain and damage throughout your body. Rheumatoid arthritis affects joint linings, causing painful swelling. Over long periods of time, the inflammation associated with rheumatoid arthritis can cause bone erosion and joint deformity.

An **autoimmune disease** is a **condition** in which your immune system mistakenly attacks your body. The immune system normally guards against germs like bacteria and viruses. When it senses these foreign invaders, it sends out an army of fighter cells to attack them.

- Few gold(I) salts are primarily found effective to reduce inflammation and to slow disease progression in patients with rheumatoid arthritis. The gold salts stop cells from releasing chemicals that can harm tissues.

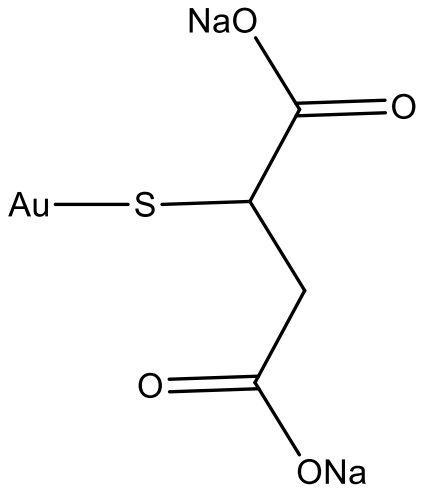
- The use of gold compounds has decreased since the 1980s because of numerous side effects and monitoring requirements, limited efficacy, and very slow onset of action.

- Most chemical compounds of gold, including some of the drugs discussed below, are not salts, but are examples of metal thiolate complexes.

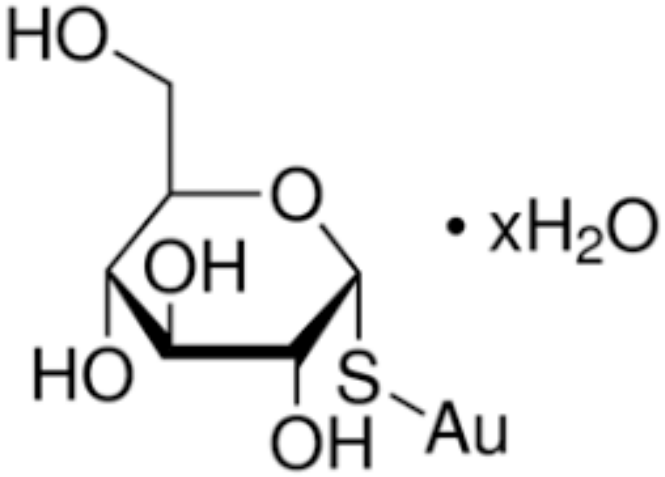
- A procedure that uses gold salts (a salt form of the metal element gold) to treat diseases, such as rheumatoid arthritis is known as called chrysotherapy or aurotherapy.

$Na_3[O_3S_2AuS_2O_3]$

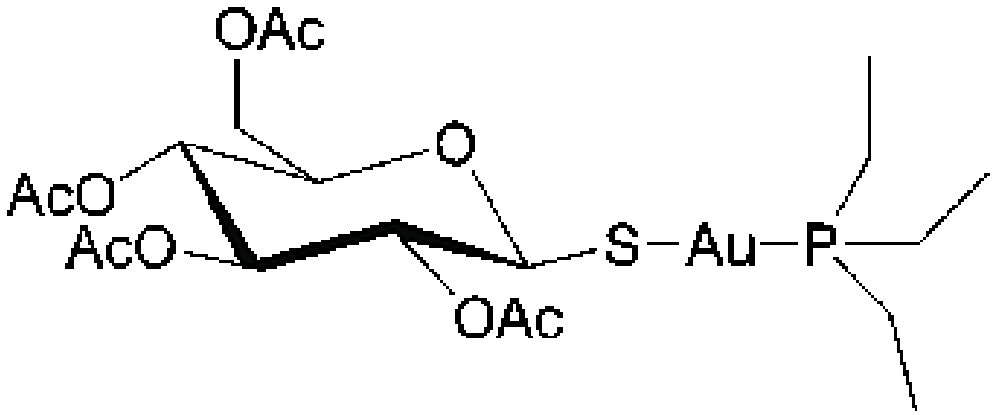
Sanocrysin



Sodium aurothiomalate



Solganol

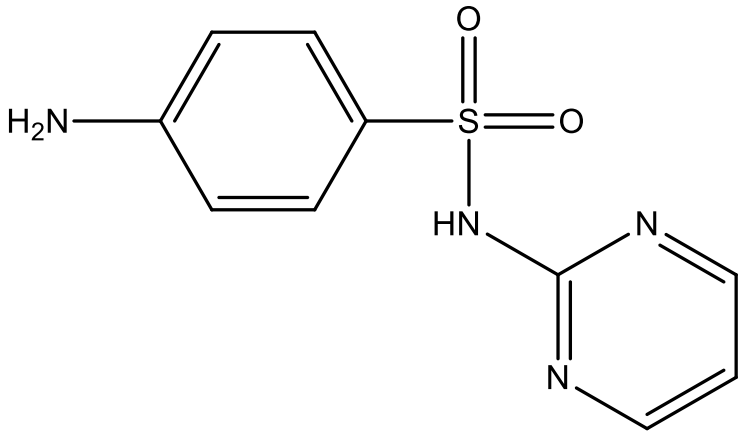


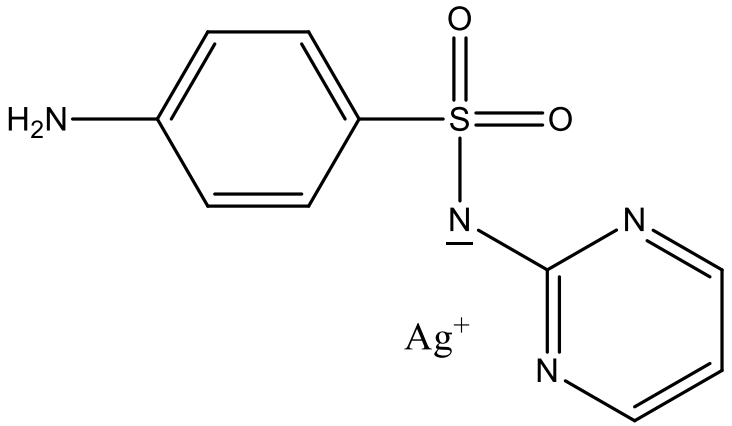
Aurafin

Silver based antimicrobial materials

Therapeutic use of simple silver salts or complex species for the treatment of local infections, mental illness, epilepsy, nicotine addiction and gastroenteritisis is known for long.

Silver sulfadiazine is used as a topical broad-spectrum antibiotic to treat bacterial infections in severe burns or chronic wounds.





$AgNO_3$ has been utilized in eye drops to prevent gonococcal ophthalmic *neonatorum* in newborns.

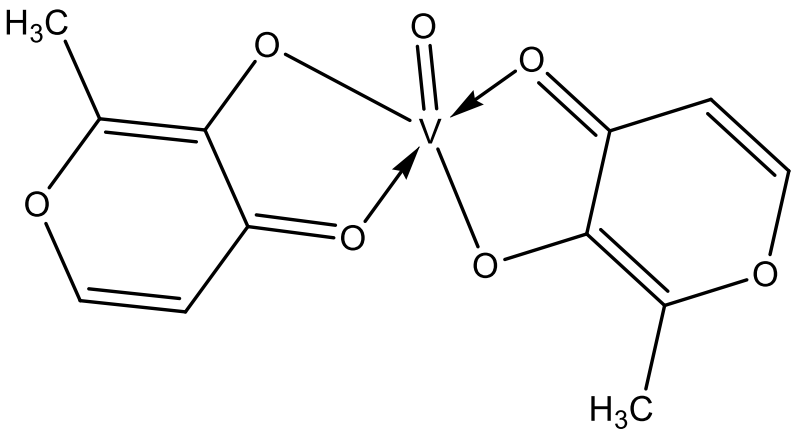
Ag NPs are widely used in wound dressings, for the treatment of burns, as water disinfectants, in antiseptic sprays, and as coatings on medical devices such as synthetic implants and urinary tract and intravenous catheters to prevent infections.

Vanadium based insulin mimetic agents

Several vanadium complexes are now known to mimic the role of the signalling hormone insulin required in glucose metabolism

Sodium orthovanadate (Na_3VO_4), Vanadyl sulfate ($VOSO_4$), peroxovanadium complexes.

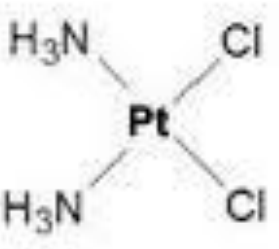
Bis(maltolato)oxovanadium(IV)



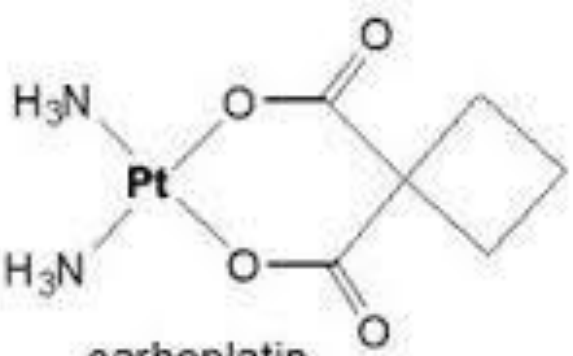
Anticancer Activity of Pt - complexes

The discovery of the powerful anticancer properties of Cis-platin (cis-diamine dichloro Pt (II), known as cis-DDP) by Rosenberg et al in the mid 1960 is a landmark in the discipline of anti metal complexes.

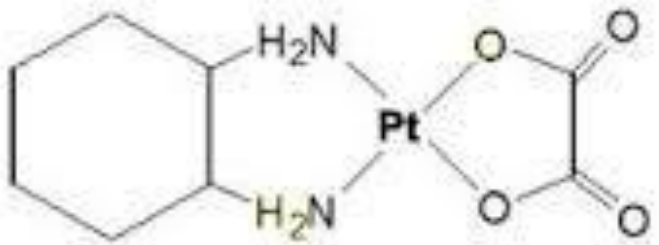
Several Pt-complexes like cis-$[Pt(NH_3)_2X_2]$, $[Pt(en)X_2]$ (X = Cl^-, Br^-, NO_2^-, etc); $[Pt(NH_3)_2X]$, [Pt(enX)], (X = malonate, oxalate) are now established to have anticancer properties. The NH_3 group may be replaced by different amines like CH_3NH_2, etc. Some important anticancer Pt(II) complexes are,



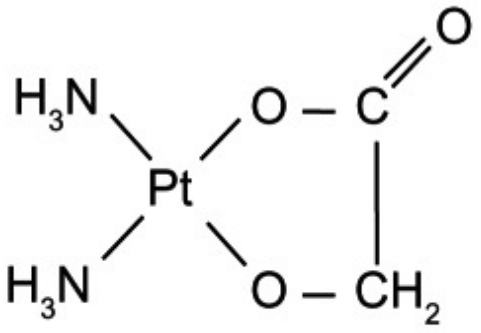
cisplatin



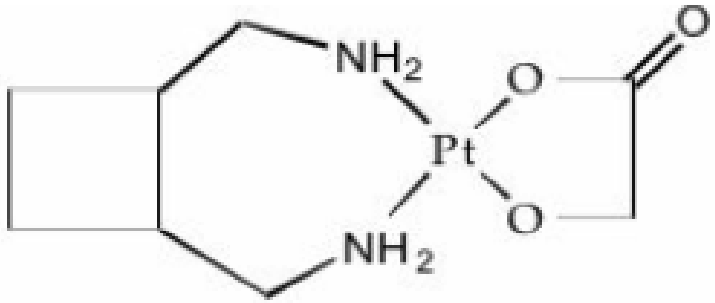
carboplatin



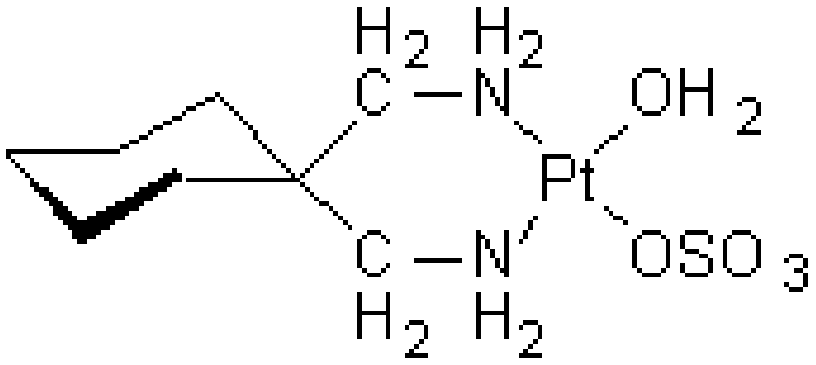
oxaliplatin



Nedaplatin



lobaplatin



Spiroplatin

It is interesting to note that though cis-platin is active, the trans-platin is inactive and toxic. Though cis-platin is quite effective for various types of cancers, it is specially effective for testicular and ovarian tumors. It is also used in the treatment of bronchogenic carcinoma, osteosarcoma, etc. In fact, cis-platin is one of the three most widely used anticancer drugs in the world.

From the knowledge of activity of the above mentioned neutral Cis-Pt (II) complexes, it has been concluded that:

(1) the compound should be neutral to allow its passive diffusion into the cells

(2) it should have cis configuration

(3) the non-leaving groups should [have poor trans-labilising power and they] should be amines.

Among the different neutral Pt(II) complexes, the two compounds Cis-platin and Carboplatin i.e., cis-diammine(1,1-cyclobutanedicarboxylato)Pt(II) have been approved worldwide for clinical use.

It may be noted that the anticancer activity is not only confined within the non-electrolytic Pt(II) complexes. The charge complexes called platinum pyrimidine blues, having structures, $Pt(NH_3)_2(pyrimidine)]X_n$ (where X = $CH_3CO_2^-$, Cl^-, etc) are known to have the therapeutic activity against some cancers. Some Pt (V) complexes like cis-$[Pt(NH_3)_2Cl_4]$, $[Pt(en)Cl_4]$ are also known to have anticancer activity.