

University of Lucknow | Centenary Year  
लखनऊ विश्वविद्यालय | शताब्दी वर्ष

## Mettalodrugs

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# M. Sc Pharmaceutical chemistry SEM-1



Medicinal uses and application of metal complexes are of current clinical and commercial importance.

The field of inorganic chemistry in medicine may be divided into two main categories: firstly, ligands as drugs which target metal ions in some form, whether free or protein-bound.

secondly, metal-based drugs and imaging agents where the central metal ion is usually the key feature of the mechanism of action.





- The application of inorganic compounds to medicine requires detailed examination of the fundamental aqueous chemistry of the proposed drug, including its pharmacokinetics, the metabolic fate in blood and intracellularly, and the effects of the drug on the target of choice.

Coordination and organometallic complexes present a wide variety of coordination spheres, ligand designs, oxidation states, and redox potentials, giving the ability to systematically alter the kinetic and thermodynamic properties of the complexes toward biological receptors.

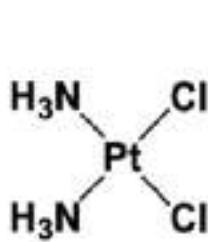




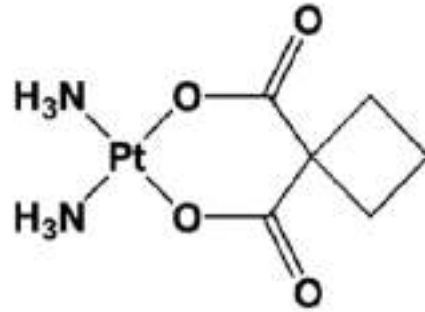
- further source of metal ion/protein interactions is provided by transferrin, whose natural iron-binding site is accessible to many metal ions of similar radius and charge including  $Ru^{2+}$ ,  $Ga^{3+}$ , and  $Al^{3+}$ .<sup>28</sup> The nature of the target to be attacked by any drug obviously depends on the specific application. Many cytotoxic metal complexes target DNA because of its importance in replication and cell viability. Coordination compounds offer many binding modes to polynucleotides, including outer-sphere noncovalent binding, metal coordination to nucleobase and phosphate backbone.



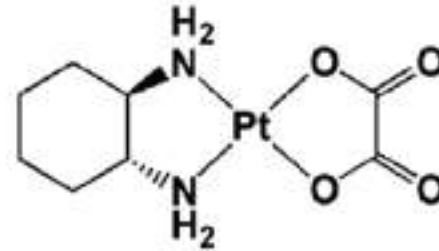
- Platinum compound as Drugs



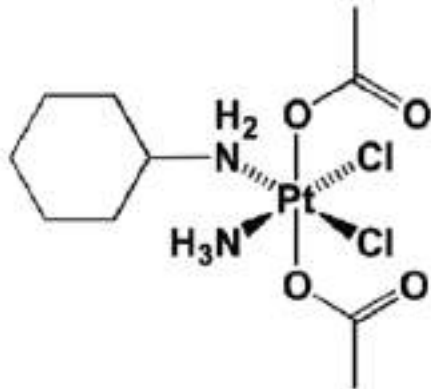
Cisplatin



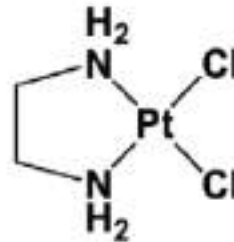
Carboplatin



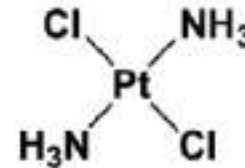
Oxaliplatin



Satraplatin



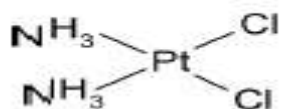
[PtCl<sub>2</sub>(en)]



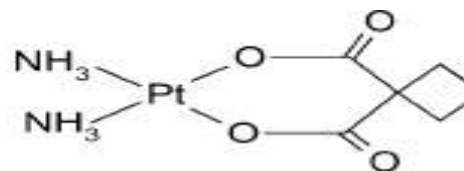
Transplatin



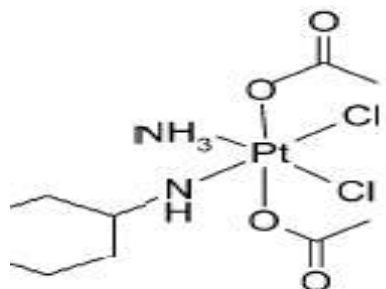
- Platinum compounds as clinical trials



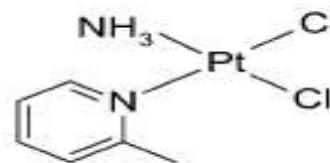
Cisplatin



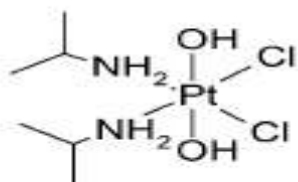
Carboplatin



Satraplatin



Picoplatin



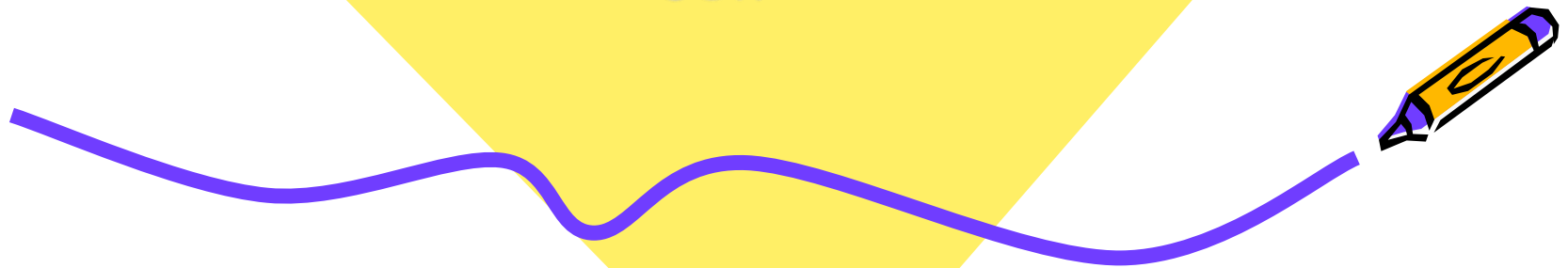
Iproplatin



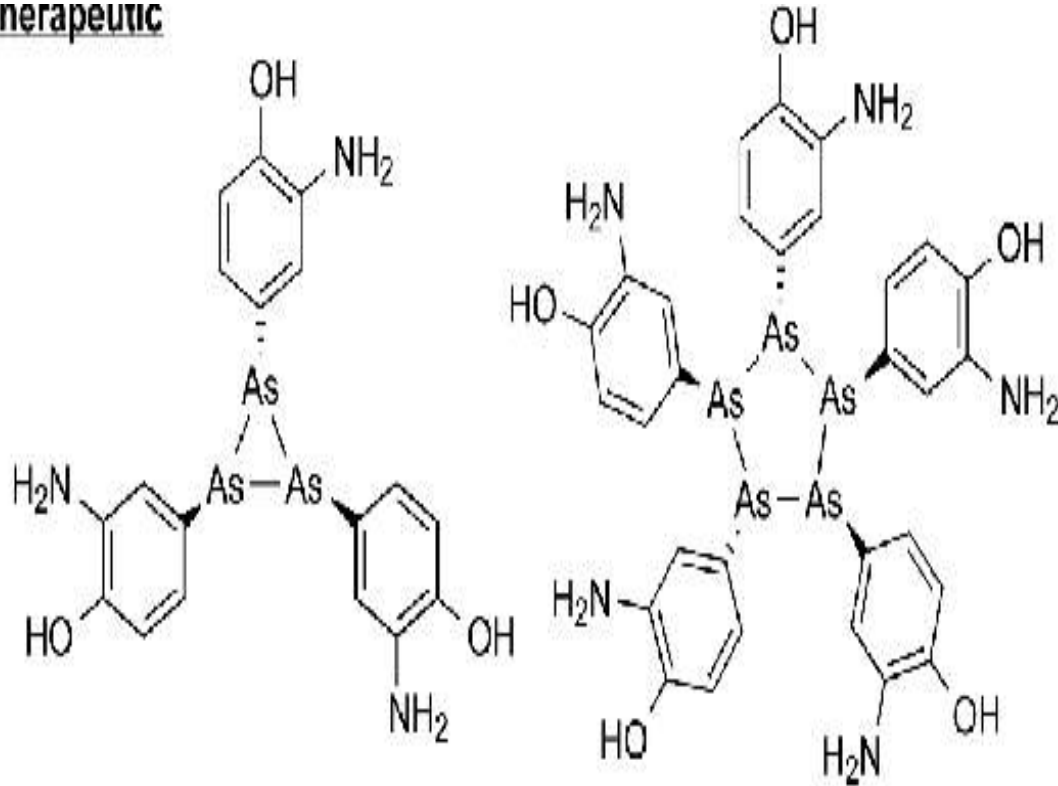


# Antimonyls (antimony compounds as DRUGS)

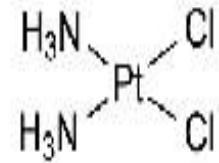
Antimony complexes have shown significant potential against tumor cell



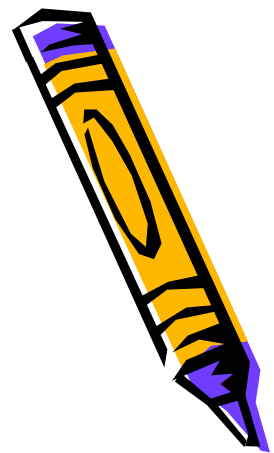
nerapeutic



cyclic species as models for **salvarsan**

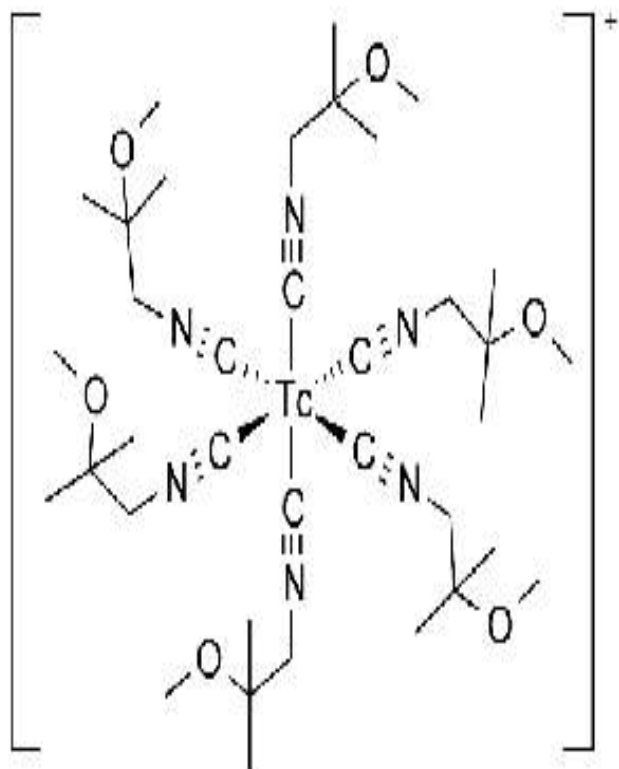


**cisplatin**

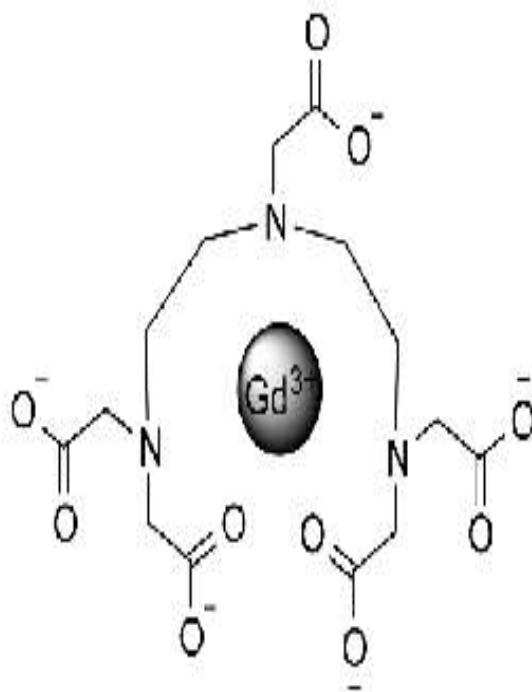




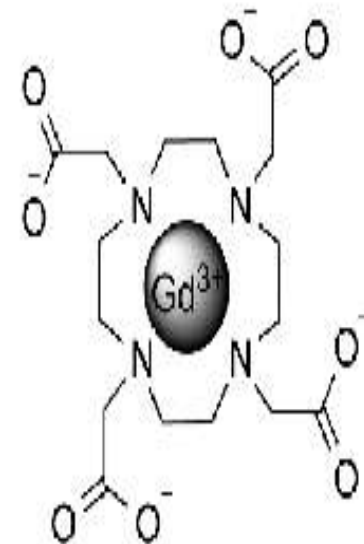
Diagnostic



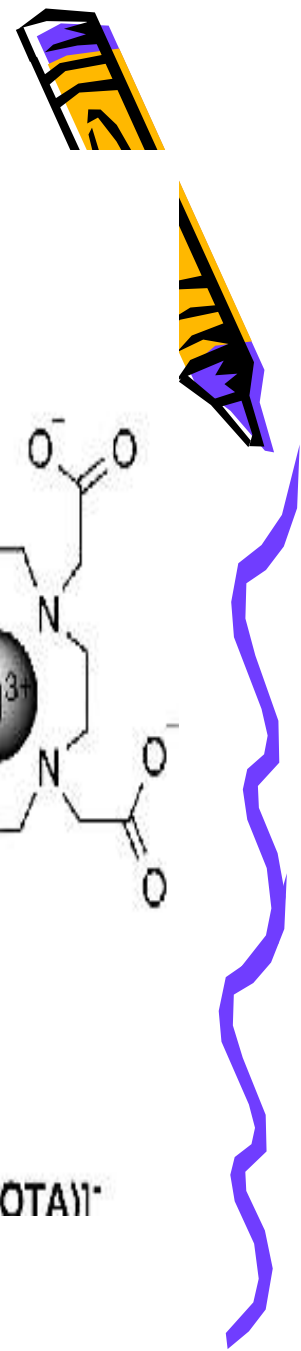
$[^{99m}\text{Tc}(\text{cycloheximide})]^{+}$

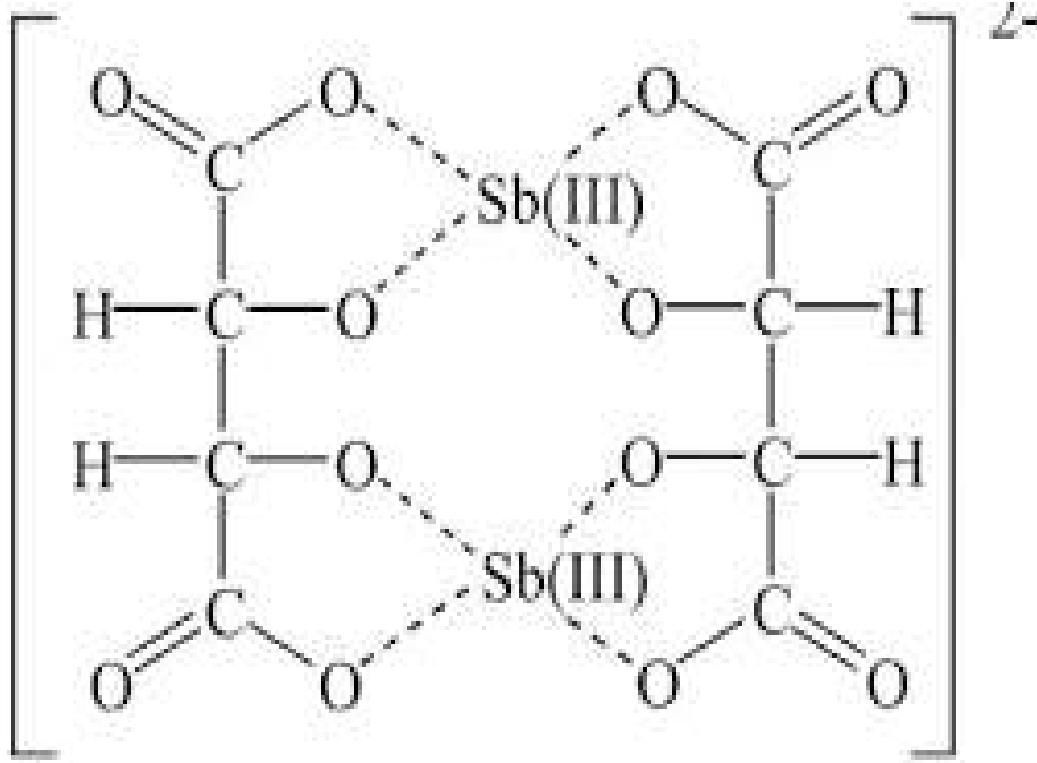


$[\text{Gd}(\text{DTPA})]^{2-}$

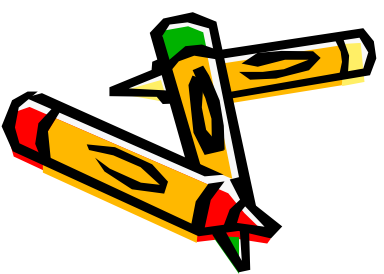


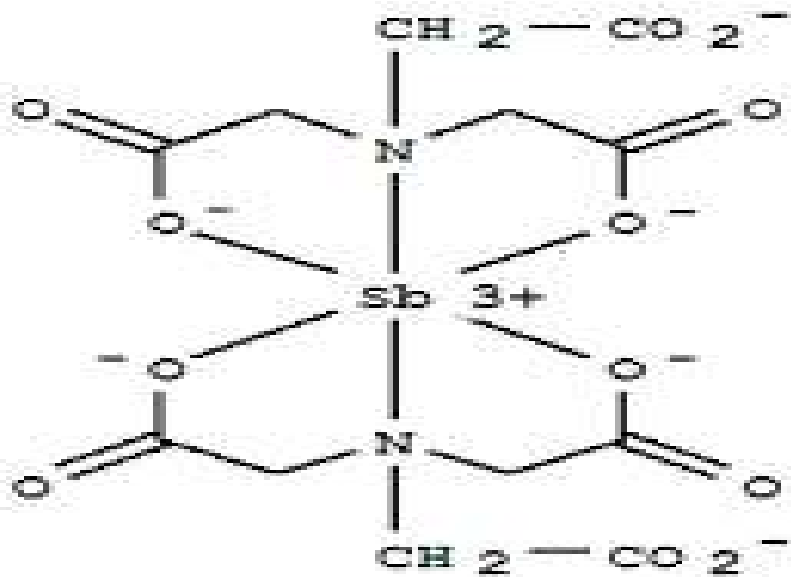
$[\text{Gd}(\text{DOTA})]^{-}$





2- 11 1 111 1 11 111 111





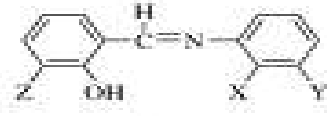
• 3  $\text{H}^+$

• 2  $\text{H}_2\text{O}$

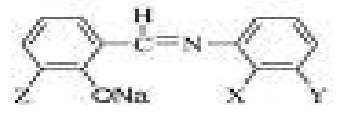




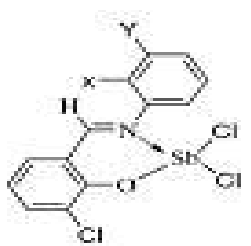
MeOH  
reflux -6 h



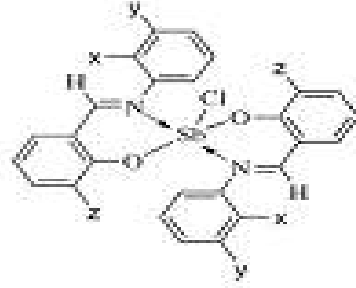
Na | MeOH  
reflux -6 h



SbCl<sub>5</sub> | C<sub>6</sub>H<sub>6</sub>  
reflux -12 h



1, 3



2, 4

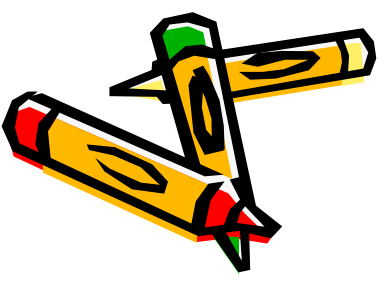
Complex

- 1
- 2
- 3
- 4

X  
CH<sub>3</sub>  
CH<sub>3</sub>  
H  
H

Y  
H  
H  
NO<sub>2</sub>  
NO<sub>2</sub>

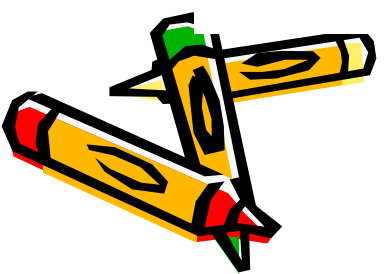
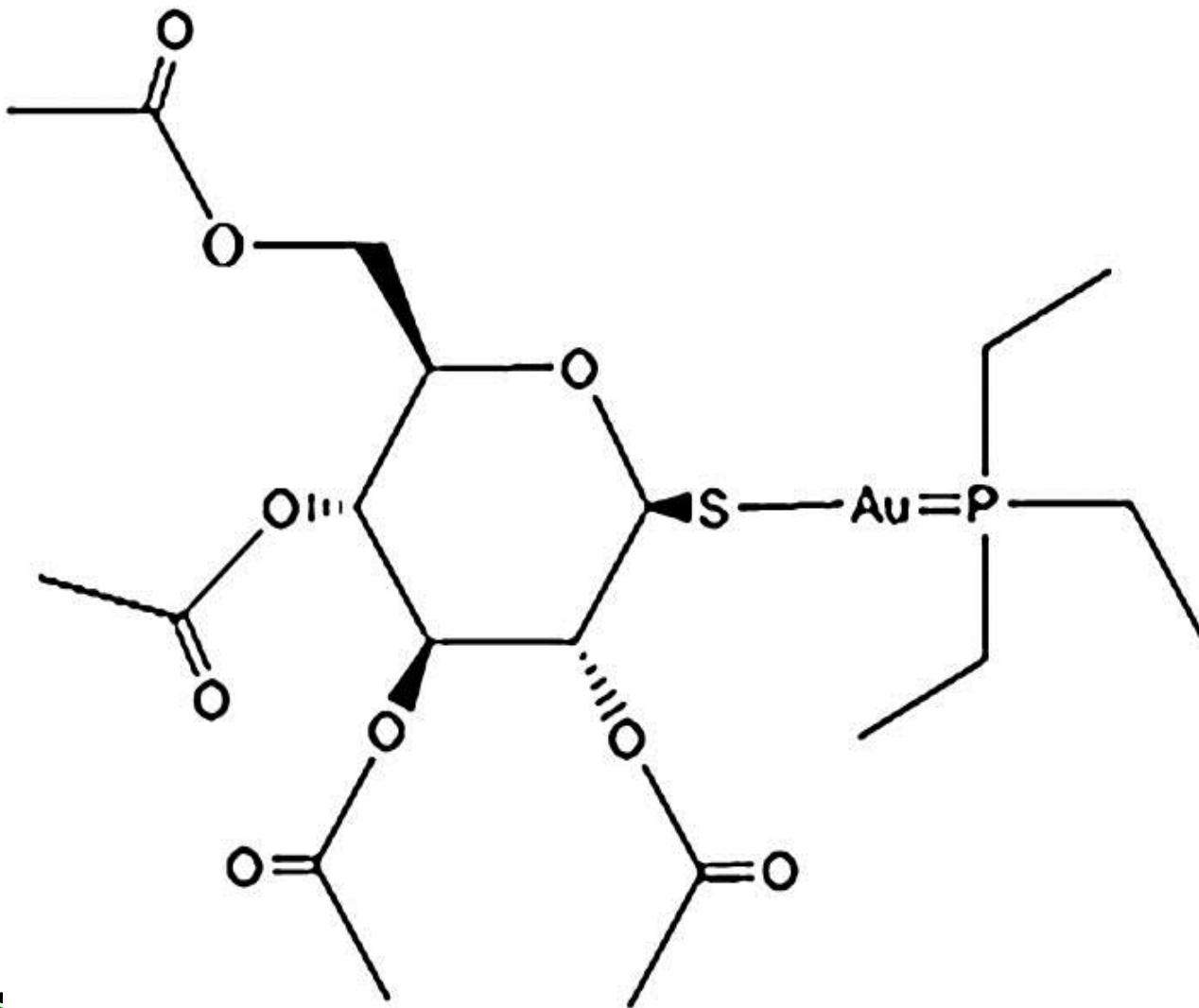
Z  
OCH<sub>3</sub>  
OCH<sub>3</sub>  
H  
H





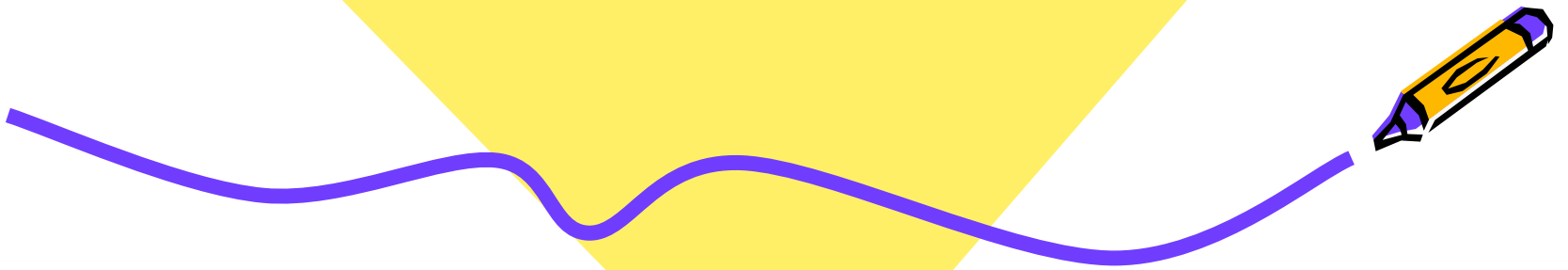
# GOLD COMPLEXES AS DRUGS

Gold sodium thiomalate is a gold-containing chemical (salt) used in treating rheumatoid arthritis. Other gold salts available include injectable aurothioglucose (Solganal) and oral auranofin (Ridaura). It is not well understood exactly how gold salts work

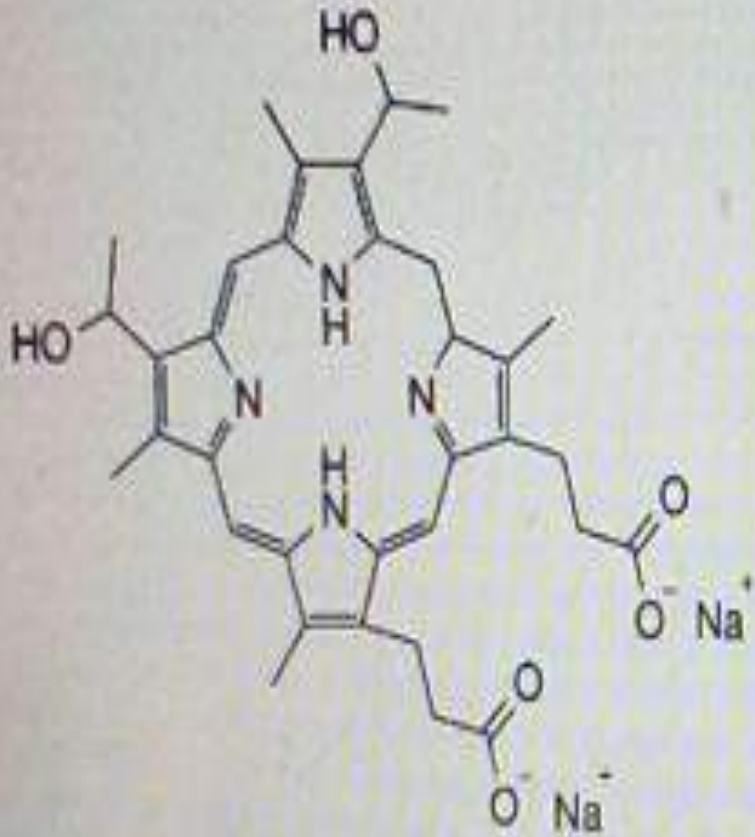




Some other metals  
used as drugs

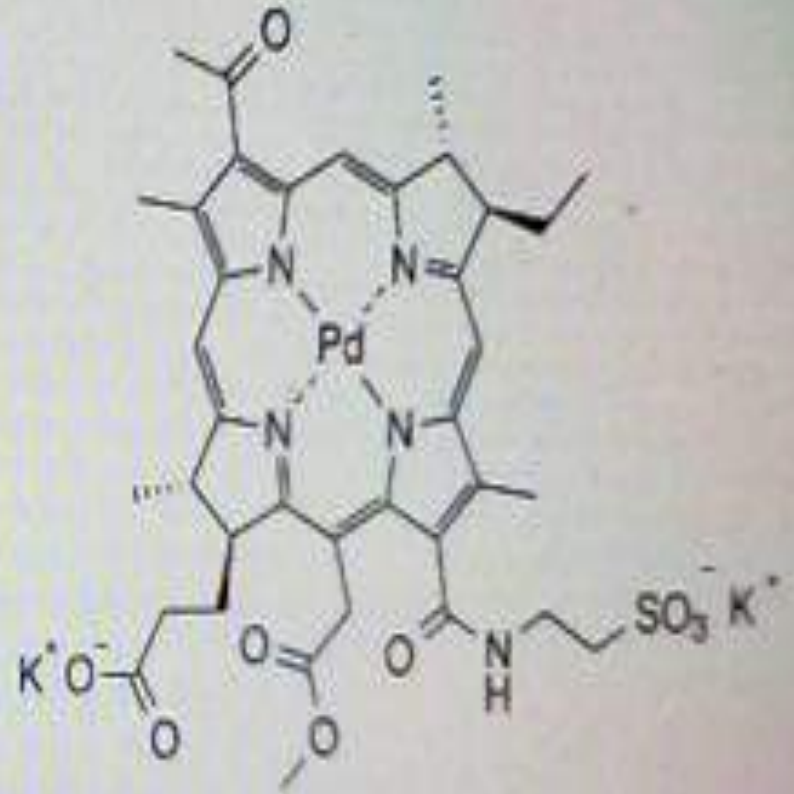


Approved



porfimer sodium

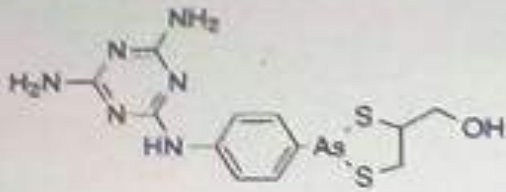
Clinical trials



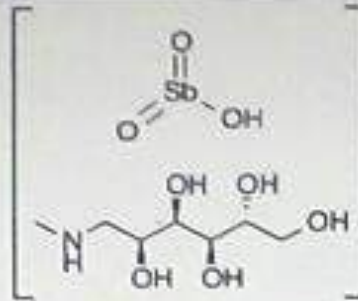
padellporfin



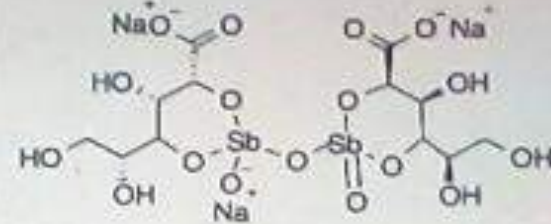
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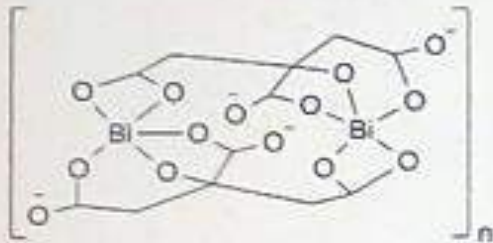
melarsoprol



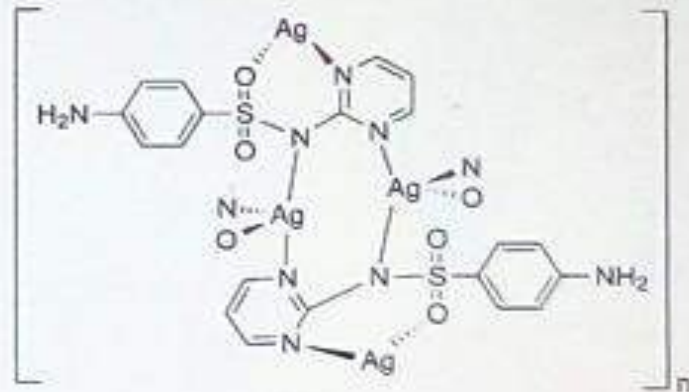
meglumine antimonate



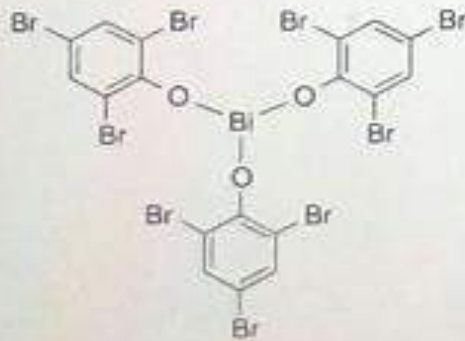
sodium stibogluconate



CBS

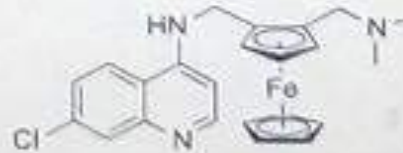


silver sulphadiazine

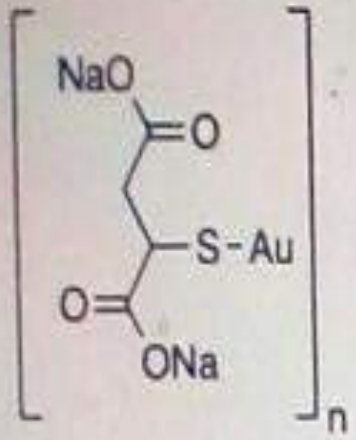


xeroform

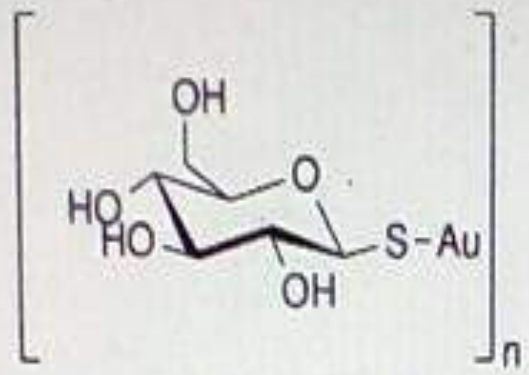
Clinical trials



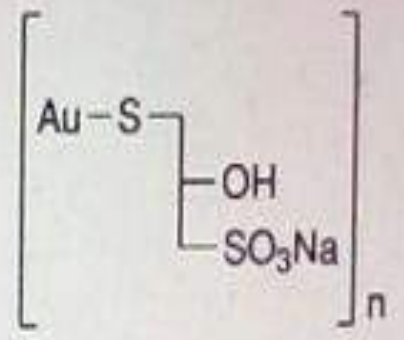
ferroquine



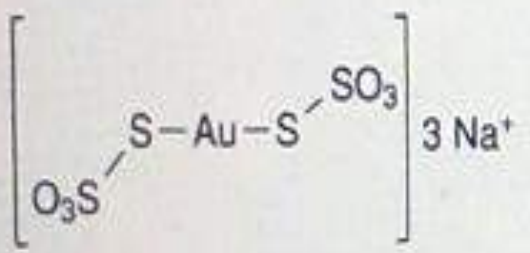
sodium aurothiomalate



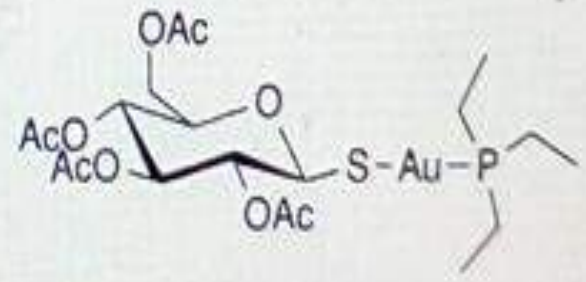
aurothioglucose



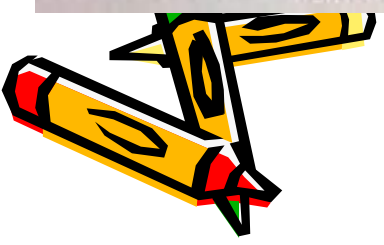
sodium aurothiopropansulfonate



sodium aurothiosulfate



auranofin





Thanks

