



Salahaddin University-Erbil
Science College
Chemistry Department

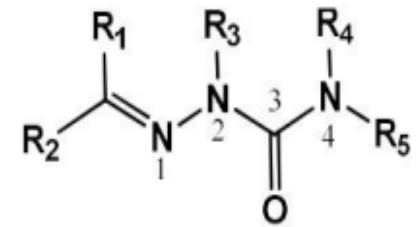
Transition metal complexes with semicarbazone ligands

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Introduction of Semicarbazone:

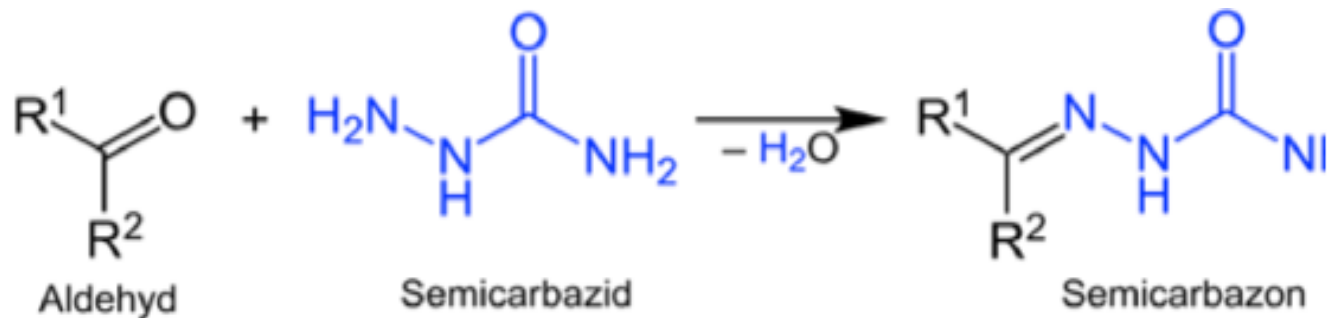
- Semicarbazone are organic compounds they are formed when aldehydes or ketones react with a semicarbazide.
- Semicarbazone have wide applications in agriculture, pharmaceutical and industrial. semicarbazone used in the qualitative organic analysis of carbonyl compounds and have wide biological applications with transition metal complexes.



R1, R2, R3, R4 = H, alkyl or aryl group

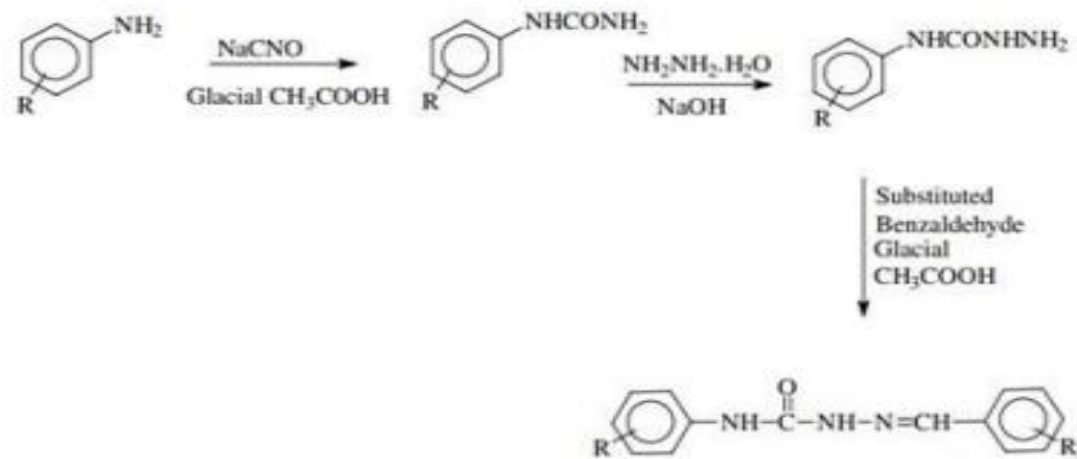
General synthesis of semicarbazone:

- Different types of semicarbazone derivatives could be synthesized by reaction of suitable aldehyde or ketone with respective semicarbazide in presence of sodium acetate



Antituberculous activity of some aryl semicarbazone derivatives:

- A N1-(4- acetamido phenyl)-N4-(2-nitro benzylidene) semicarbazone (1b). aryl semicarbazones are reported to possess antimycobacterials potency greater than p-aminosalicylic acid, ethionamide, ethambutol, ciprofloxacin and kanamycin.



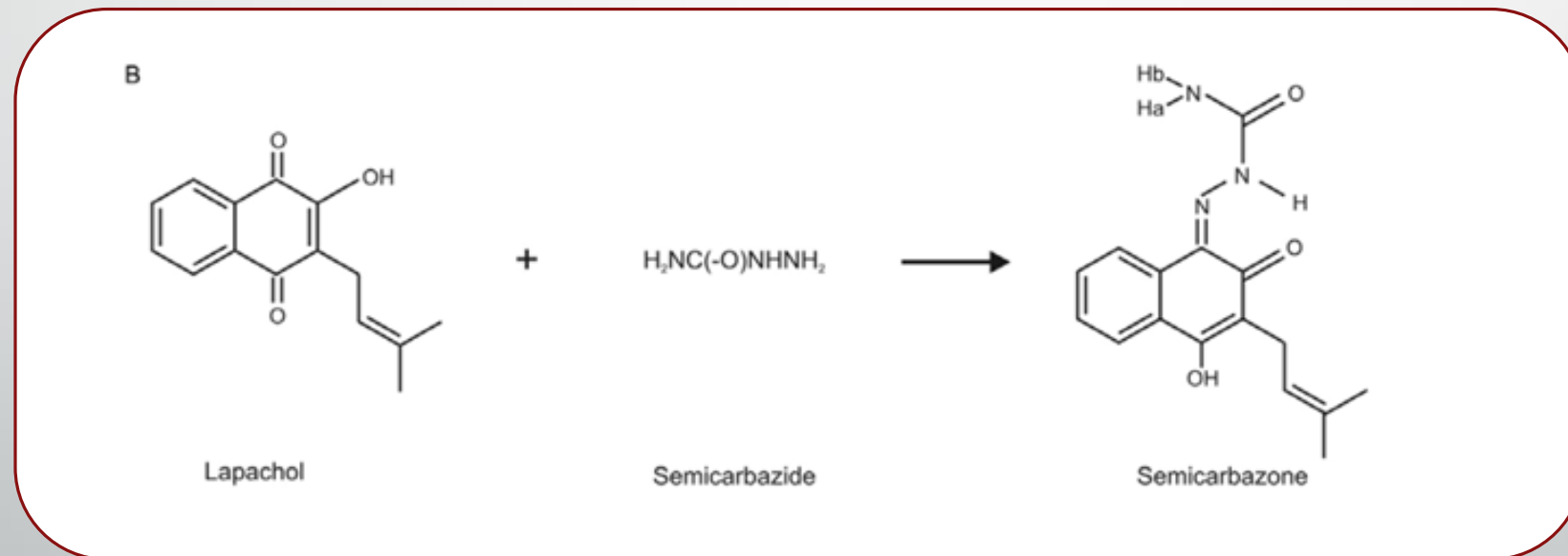
Compound: 1b

R: 4-NHCOCH₃

R₁: 3-NO₂

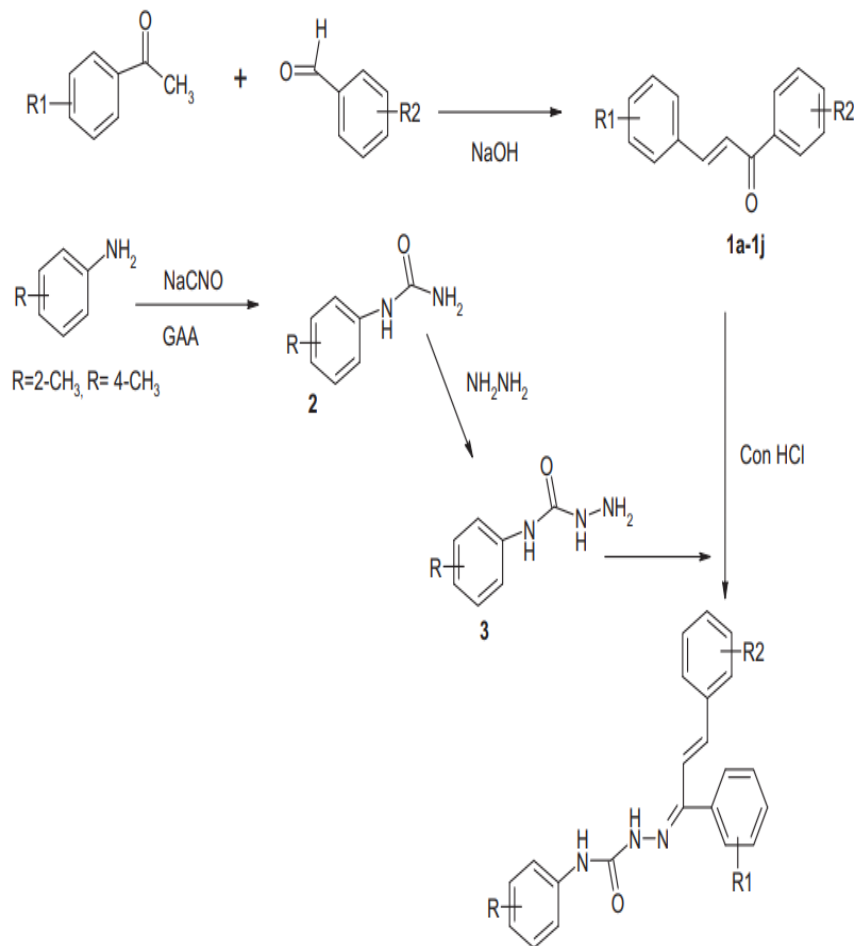
The antimicrobial activity of lapachol semicarbazone:

- Lapachol is a natural pigment that was originally isolated from species of the Bignoniaceae family. Lapachol was chemically modified to obtain its semicarbazone derivatives. These compounds were tested for antimicrobial activity against several bacteria and fungi.



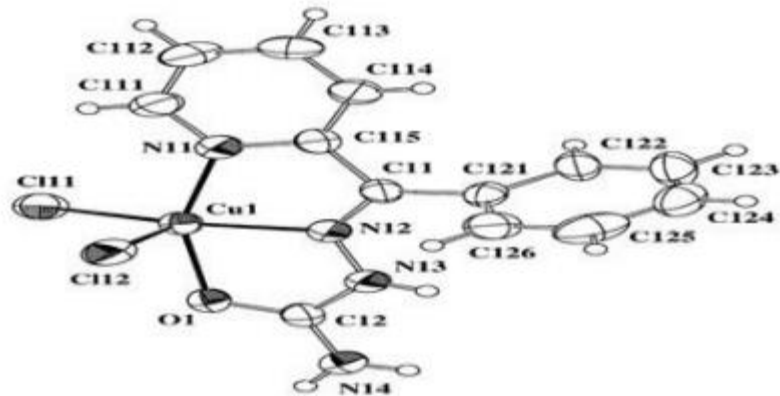
Synthesis of methyl semicarbazone derivatives

- A series of novel chalconesemicarbazones was synthesized and evaluated for their antioxidant activity. Most of the compounds were found to be potent antioxidants. Free radicals play an important role in various pathological and xenotoxic effects so antioxidant may have protective role in these pathological conditions

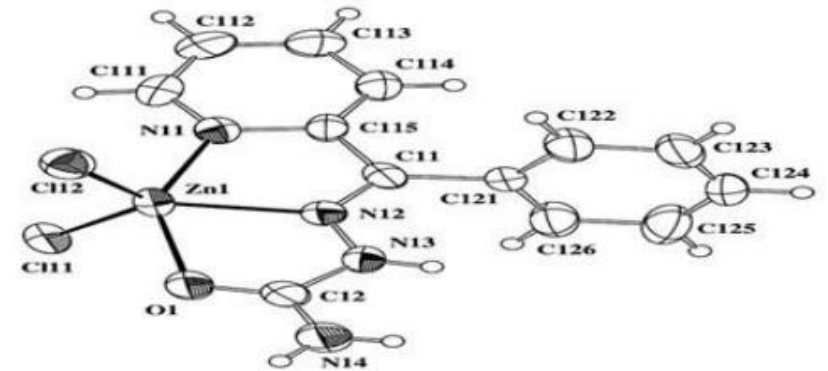


Metal complexes of 2-benzoylpyridine semicarbazone:

- 2-Benzoylpyridine semicarbazone (H₂BzPS) and its complexes [Cu(H₂BzPS)Cl₂] (1) and [Zn(H₂BzPS)Cl₂] (2) have been synthesized. In both cases, the neutral semicarbazone acts as a tridentate ligand which coordinates the metal through the pyridine and imine nitrogen atoms and the carbonyl oxygen.



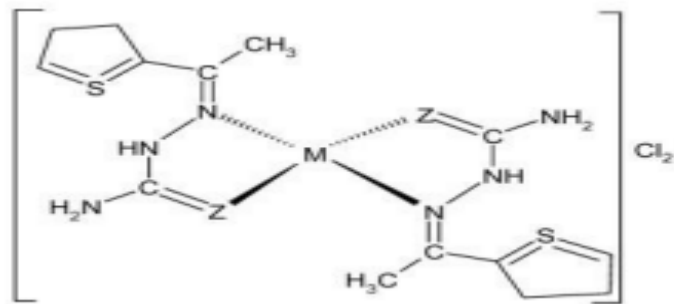
[Cu(H₂BzPS)Cl₂]



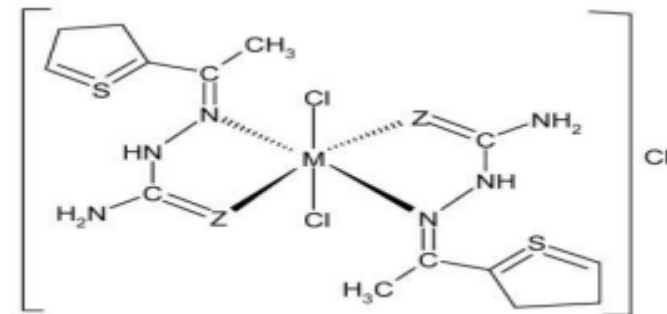
[Zn(H₂BzPS)Cl₂]

Pd(II), Pt(II), Rh(III), Ir(III), and Ru(III) Complexes Derived from Semicarbazone of 2-acetyl thiophene:

- metal complexes of Pd(II), Pt(II), Rh(III), Ir(III), and Ru(III) with semicarbazone of 2-acetyl thiophene have been synthesized. The synthesized ligands and their complexes have been screened for bactericidal activity against several bacterial species (i.e., *B. macerans*, *A. aureus*, *E. coli*).



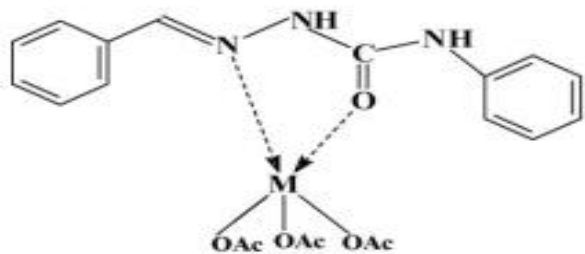
$[M(L)_2]Cl_2$; $M = Pd(II), Pt(II)$



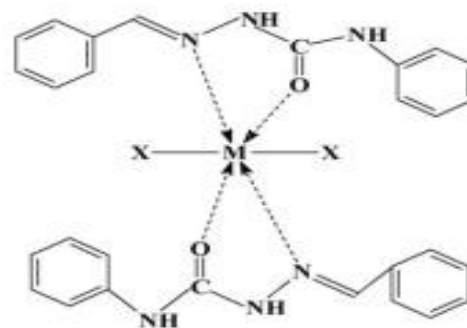
$[M'(L)_2Cl_2]Cl$; $M' = Rh(III), Ir(III)$

Antimicrobial studies of Cr(III), Mn(II), Fe(III), Co(II), Cu(II), Ni(II), Zn(II), Cd(II)

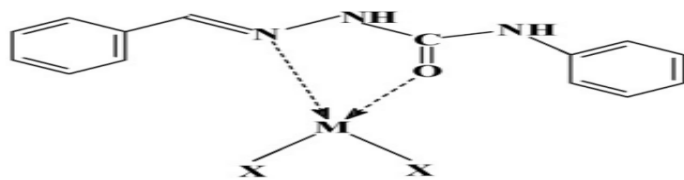
- Eight transition metal complexes of benzaldehyde-N(4)-phenylsemicarbazone have been synthesized and All complexes along with their parent semicarbazone ligand were screened against five bacterial cultures viz., E. coli, Salmonella typhi, Proteus vulgaris, Enterobacter aerogenes, Bacillus megaterium and two fungal cultures viz., Aspergillus niger and Candida albicans.



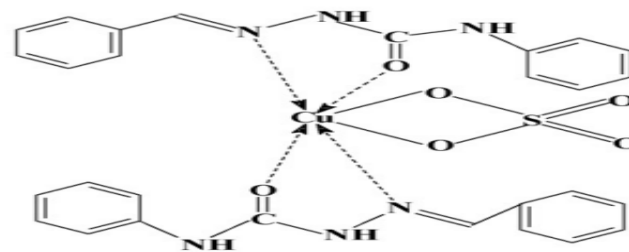
[Cr(HL)(OAc)₃]



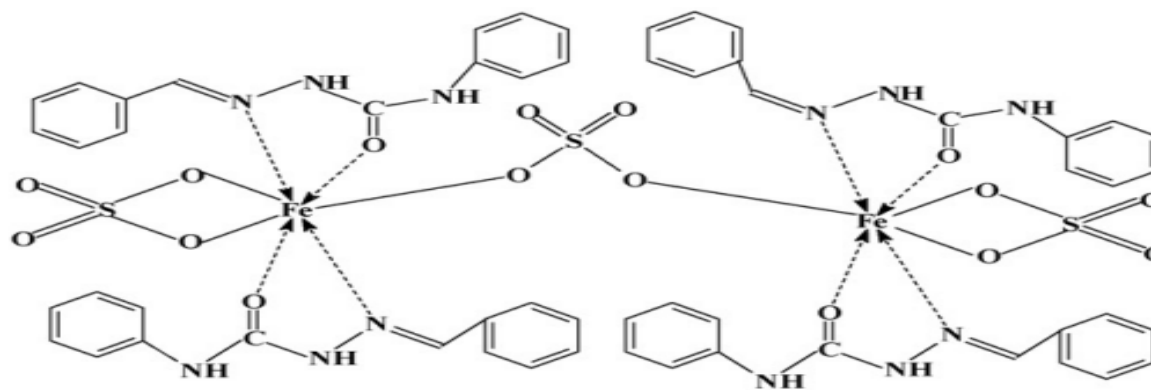
[M(HL)₂X₂] M=Mn,Zn,Cd X=OAc,NO₂



$[M(HL)X_2]$ M=Co,Ni X=OAc,NO₂



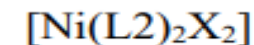
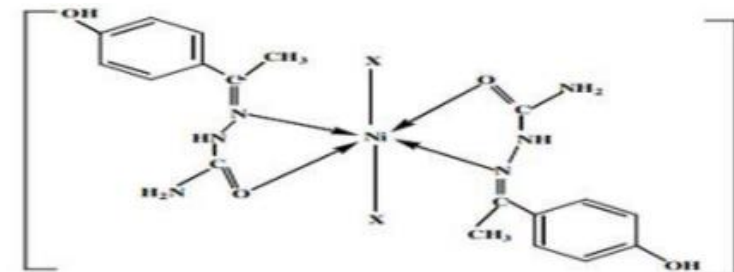
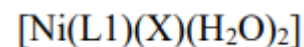
$[Cu(HL)_2SO_4]$



$[Fe_2(HL)_4(SO_4)_3]$

Synthesis of nickel(ii) complexes with Salicylaldehyde semicarbazone (L1) and 4-hydroxy acetophenone semicarbazone(L2):

- Ni(II) complexes containing ligands Salicylaldehyde semicarbazone (L1), and 4- hydroxy acetophenone semicarbazone(L2), have been synthesized. involvement of oxygen from ($-C=O$) group and azomethine nitrogen in coordination with (L1) in coordination to the central metal ion act as tridentate ligand and involvement of oxygen from ($-C=O$) group and azomethine nitrogen with (L2) in coordination to the central metal ion act as bidentate ligand.



(where $\text{X} = \text{Cl}^- \cdot \text{NO}_3^-$).

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