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Study of Benzothiazole Derivative Schiff Base Ligand With Metal Complexes of Ni (ii), Co(ii) and Cu(ii)

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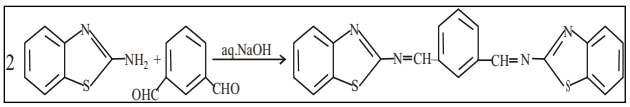
Abstract

A hot ethanolic solution of two molecules of ligand L_2 (0.414 g, 0.001 mol) and hot ethanolic solution (20 ml) of corresponding metal salt $NiCl_2$ (0.1297g; 0.001 mol) were mixed up together with constant stirring. Then the mixture was refluxed for 4 hrs at room temperature. On cooling the complex of Ni(II) was precipitated. The product obtained was filtered and washed with cold ethanol and dried with ether on cooling a solid condensed product was formed which was filtered and washed with ethanol then dried with ether. A crystal from hot ethanol gave ligand L_2 i.e. 2-hydroxy 1,3-bis-(benzothiazole aldimine) benzene (HBTAB).

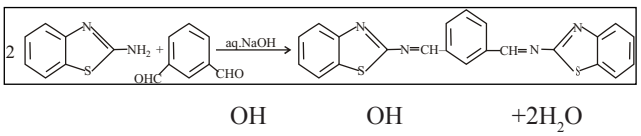
Keywords: Complex, Cooling, Ligand, Constant, Crystal, Mixture, Ethanol

Synthesis of ligand – $L_1[(C_8H_5N_2S)_2C_6H_4]$ 1,3-bis (benzothiazole aldimine) benzene (BTAB) (L_1) 0.15 g, 0.001 mol 2-amino benzothiazole (2-ABT)-in 10 ml ethanol was added to hot ethanol solution (30 ml) of 0.134 g, 0.001 mol of 3-formyl benzaldehyde then 2-3 drops of conc. H_2SO_4 were added to the mixture and the mixture refluxed for two-three hours. On cooling a solid condensed product was formed which was filtered and washed with ethanol then with ether and dried. A crystal from hot ethanol gave ligand (L_1) i.e. 1,3-bis (benzothiazole aldimine) benzene (BTAB).



Preparation of- 1, 3-bis (benzothiazole aldimine) benzene (L_1)

Synthesis of ligad-$L_2[(C_8H_5N_2S)_2C_6H_4O]$ 2-hydroxy 1,3-bis-(benzothiazole aldimine) benzene (HBTAB) (L_2) 0.15 g, 0.001 mol of 2-amino benzothiazole (2-ABT) in 10 ml ethanol was added to hot ethanol solution (30 ml) of 0.15 g, 0.001 mol of 3-formyl-2-hydroxy benzaldehyde then 2-3 drops of conc. H_2SO_4 were added to the mixture and the mixture refluxed for 2-3 hrs. On cooling a solid condensed product was formed which was filtered and washed with ethanol then dried with ether. A crystal from hot ethanol gave ligand L_2 i.e. 2-hydroxy 1,3-bis-(benzothiazole aldimine) benzene (HBTAB).



Preparation of 2-hydroxy 1,3-bis-(benzothiazole aldimine) benzene (HBTAB) (L_2)

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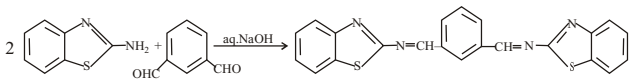
Source of Support: None; **Conflict of Interest:** None

Synthesis of ligand-L_3 [$(C_8H_5N_2S)_2C_9H_{10}$] 1,3-bis-(benzothiazole aldimine-5-(1-methylethyl) benzene. (BTAMEB) 0.15 g, 0.001 mol of 2-amino benzothiazole (2-ABT) in 10ml ethanol was added to hot ethanol solution (30 ml) of 0.178 g, 0.001 mol of 5-isopropyl formyl benzaldehyde then 2-3 drops of conc. H_2SO_4 were added to the mixture and the mixture refluxed for 2-3 hrs on cooling a solid condensed product was formed which was filtered and washed with ethanol then dried with ether. A crystal from hot ethanol gave ligand L_3 i.e. 1,3-bis(benzothiazolealdemine-5-(1-methylethyl) benzene (BTAMEB).



5-isopropyl 3-formyl benzaldehyde (L_3) + $2H_2O$

Preparation of-1,3- bis (benzothiazole aldimine) 5-(1-methylthyl) benzene (L_3)

Preparation of metal complex $[Ni(L_1)_2]Cl_2$ Bis-[bi-benzothiazole aldimine benzene] nickel(II) chloride A hot ethanol solution of two molecules of ligand L_1 (0.398 g, 0.001 mol) and hot ethanolic solution (20ml) of corresponding metal salt $NiCl_2$ (0.1297g; 0.001mol) were mixed up together with constant stirring. Then mixture was refluxed for 4 hrs. at room temperature. On cooling the complex of Ni(II) was precipitated. The product obtained was filtered and washed with cold ethanol and dried with ether.

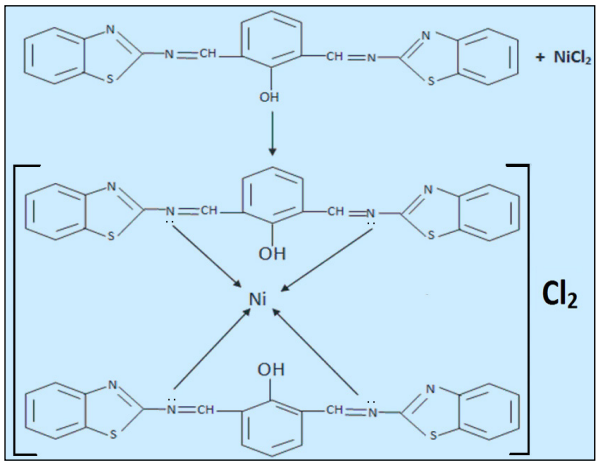
Finally crystallization from aqueous ethanol gave the metal complex i.e. Bis[bi-benzothiazole aldimine benzene] nickel(II) chloride.

RESULTS AND DISCUSSION

Preparation of metal complex $[Ni(L_2)_2]Cl_2$ Bis-[2-hydroxy 1,3-bis-benzothiazole aldimine) benzene] nickel(II) chloride: A hot ethanolic solution of two molecules of ligand L_2 (0.414 g, 0.001 mol) and hot ethanolic solution (20 ml) of corresponding metal salt $NiCl_2$ (0.1297g; 0.001 mol) were mixed up together with constant stirring. Then the mixture was refluxed for 4 hrs at room temperature. On cooling the complex of Ni(II) was precipitated. The product obtained was filtered and washed with cold ethanol and dried with ether.

Finally crystallization from aqueous ethanol gave the metal complex i.e. bis[1,5-bis (benzothiazole aldimine benzene] Nickel (II) chloride.

Preparation of metal complex $[Ni(L_2)_2]Cl_2$



Preparation of metal complex $[Ni(L_3)_2]Cl_2$

$[Ni\{(C_8H_5N_2S)_2C_6H_4O\}_2]Cl_2$

Bis-[2-hydroxy 1,3-bis-benzothiazole aldimine) benzene]nickel(II) chloride

Preparation of metal complex $[Ni(L_3)_2]Cl_2$

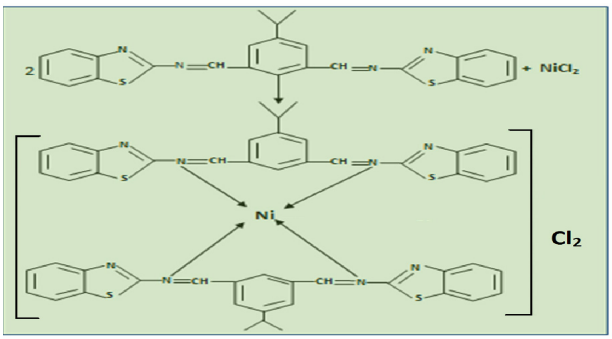
Bis[1,3-bis-(benzothiazole aldimine-5-(1-methylethyl) benzene] nickel(ii) chloride

A hot ethanolic solution of two molecules of ligand L_3 (0.440 g, 0.001 mol) and hot ethanolic solution (20ml) of were mixed up together with constant stirring. Then the mixture was refluxed for 4 hrs. at room temperature. On cooling the complex of Ni(II) was precipitated. The product obtained was filtered and washed with cold ethanol and dried with ether.

Finally crystallization from aqueous ethanol gave the metal complex i.e. Bis-[1,3-bis-(benzothiazole aldimine-5-(1-methylethyl) hexzene] nickel(ii) chloride.

Preparation of metal complex $[Ni(L_3)_2]Cl_2$

Bis[1,3-bis-(benzothiazole aldimine-5-(1-methylethyl) benzene] nickel (II) chloride



Bis[1,3-bis-(benzothiazole aldimine-5-(1-methylethyl) benzene] nickel(II) chloride

Preparation of metal complexes[$Co(L_1)_2$]Cl_2

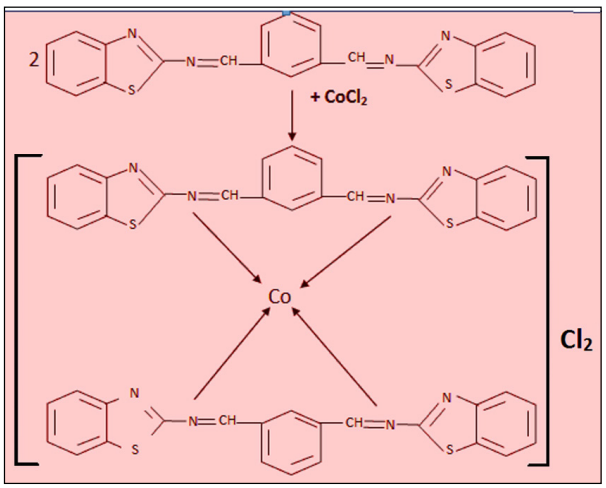
bis-[bi-benzothiazole aldimine benzene] Cobalt(II) chloride.

A hot-ethanolic solution of two molecules of ligand L_1 (0.398g, 0.001mol) and hot ethanolic solution (20ml) of corresponding metal salt $CoCl_2$ (0.1299g, 0.001mol) were mixed up together with constant stirring. Then mixture was refluxed for 4 hrs. at room temperature. On cooling the complex of Co(II) was precipitated. The product was filtered and washed with cold ethanol and dried with ether.[4]

Finally crystallization form aqueous ethanol gave the metal complex i.e. bis[bi-benzothiazole aldimine benzene] cobalt(II) chloride

Preparation of metal complex[$Co(L_1)_2$]Cl_2

Bis-[bi-benzalthiazolealdimine benzene]Cobalt (II) Chloride

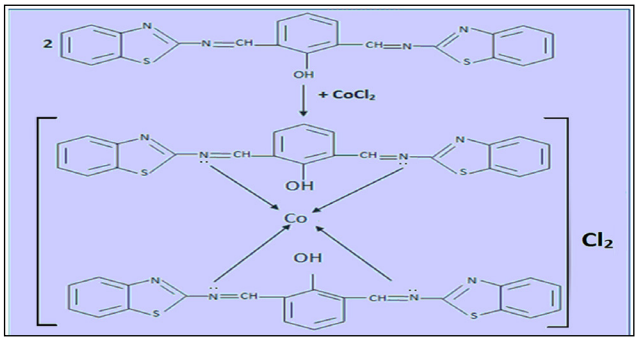


Preparation metal complex [$Co(L_2)_2$]Cl_2

Bis-[2-hydroxy-1,3-bis-(benzothiazole aldimine) bezene] cobalt (II) chloride

A hot ethanolic solution of two molecules of ligand L_2 (0.414 g, 0.001 mol) and hot ethanolic solution (20 ml) of corresponding metal salt $CoCl_2$(0.1299 g, 0.001 mol) were mixed up together with constant stirring. Then the mixture was refluxed for 4 hrs at room temperature. On cooling the complex of Co(II) was precipitated. The product obtained was filtered and washed with cold ethanol and dried with ether.

Finally crystallization from aqueous ethanol gave the metal complex i.e. Bis-[2-hydroxy 1,3-bis-(benzothiazole aldimine) benzene] cobalt(II)chloride



Preparation of metal complex[$Co(L_2)_2$]Cl_2

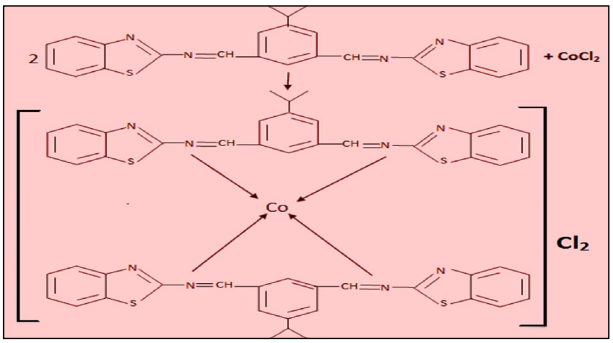
[$Co\{(C_8H_5N_2S)_2C_6H_4O\}_2$]$Cl_2$

Bis-[2-hydroxy 1,3-bis-(benzothiazole aldimine) bezene] cobalt (II) chloride

Preparation of metal complex [$Co(L_3)_2$]Cl_2

A hot ethanolic solution of two molecules of ligand L_3 (0.440 g, 0.001 mol) and hot ethanolic solution (20ml) of corresponding metal salt $CoCl_2$ (0.1299 g, 0.001mol) were mixed up together with constant stirring. Then the mixture was refluxed for 4 hrs. at room temperature. On cooling the complex of Co(II) was precipitated. The product obtained was filtered and washed with cold ethanol and dried with ether.

Finally crystallization form aqueous ethanol gave the metal complex i.e. Bis-[1,3-bis-(benzothiazole aldimine-5-(1-methy ethyl) benzene] cobalt(II) chloride.

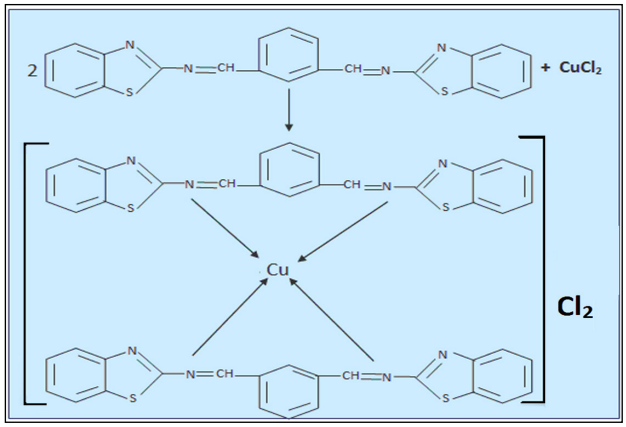


Preparation of metal complex[$Cu(L_1)_2$]Cl_2

Bis[bi-benzothiazole aldimine benzene] copper(II) chloride

A hot ethanolic solution of two molecules of ligand L_1 (0.398g, 0.001mol) and hot ethanolic solution (20ml) of corresponding metal salt $CuCl_2$ (0.1345g, 0.001mol) were mixed up together with constant stirring. Then the mixture was refluxed for 4 hrs. at room temperature. On cooling the complex of Cu(II) was precipitated. The product obtained was filtered and washed with cold ethanol and dried with ether.

Finally crystallization from aqueous ethanol gave the metal complex i.e. Bis[bi-benzothiazole aldimine benzene] copper (II) chloride.

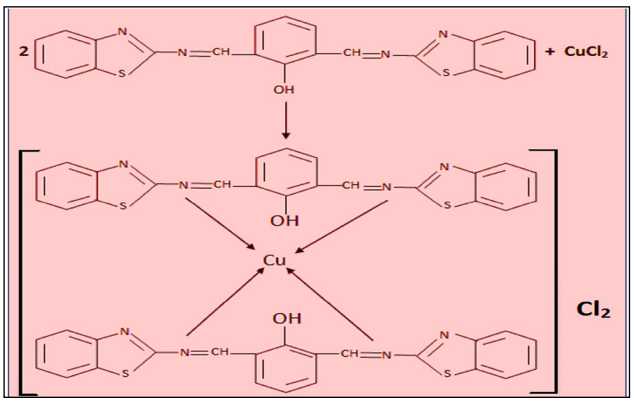


Preparation metal complex $[Cu(L_2)_2]$ Cl_2

Bis-[2-hydroxy 1,3-bis-(benzothiazole aldimine) benzene] copperl(II) chloride

A hot ethanolic solution of two molecules of ligand L_2 (0.414g, 0.001mol) and hot ethanolic solution (20ml) of corresponding metal salt $CuCl_2$ (0.1345g, 0.001mol) were mixed up together with constant stirring. Then the mixture was refluxed for 4 hrs. at room temperature on cooling the complex of Cu(II) was precipitated. The product obtained was filtered and washed with cold ethanol and dried ether.

Finally crystallization from aqueous ethanol gave the metal complex, i.e. bis[1,5-bis(benzothiazole aldimine benzene] copper(ii) chloride.



Preparation of metal complex$[Cu(L_2)_2]Cl_2$

Bis-[bi-benzalthiazolealdimine benzene]Copper (ii) Chloride

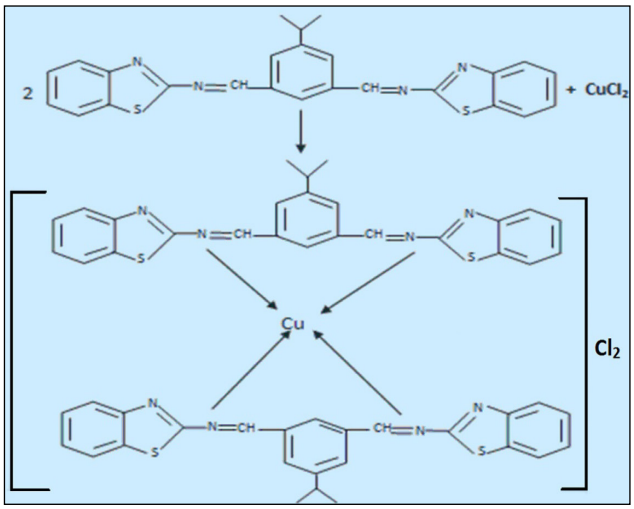
Preparation of metal complex $[Cu(L_3)_2]Cl_2$

Bis[1,3-bis-(benzothiazolealdimine-5-(1-methylethyl) benzene] copper(II) chloride.

A hot ethanolic solution of two molecules of ligand L_3 (0.440g, 0.001mol) and hot ethanolic solution (20ml) of corresponding metal salt $CuCl_2$ (0.1345g, 0.001mol) were mixed up together either constant stirring. Then the mixture was refluxed for 4 hrs. at room temperature on cooling the complex of Cu(II) was precipitated. The product obtained was filtered and washed with cold ethanol and dried with ether.

Finally crystallization from aqueous ethanol gave the metal complex i.e. Bis[1,3-bis-(benzothiazole aldimine) benzene] Copper(II) chloride.

Preparation of metal complex



CONCLUSION

Synthesis of ligand-L_3 $[(C_8H_5N_2S)_2C_9H_{10}]$ 1,3-bis-(benzothiazole aldimine-5-(1-methylethyl) benzene. (BTAMEB) 0.15g, 0.001 mol of 2-amino benzothiazole (2-ABT) in 10 ml ethanol was added to hot ethanol solution (30 ml) of 0.178 g, 0.001 mol of 5-isopropyl formyl benzaldehyde then 2-3 drops of conc. H_2SO_4 were added to the mixture and the mixture refluxed for 2-3 hrs on cooling a solid condensed product was formed which was filtered and washed with ethanol then dried with ether.

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