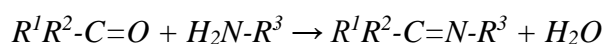


EXPERIMENT NUMBER	13
THE NAME OF THE EXPERIMENT	SOME OF THE METAL COMPLEXES OF SCHIFF BASES
FORMULA	$R^1R^2-C=N-R^3$

REACTION EQUATION



EXPERIMENTAL PROCEDURE

A weighing of 0.01 mole is taken from the metal acetate salt. Depending on the reaction equation, the amount of amine and the aldehyde equivalent to the metal salt is weighed and placed in a beaker. 50 mL of methanol is added and the reaction mixture is dissolved. Metal acetate salt is added to this mixture and the mixture is heated up to the boiling temperature. The solution is then left to crystallize. The crystals formed are filtered and dried in the air.

EXPERIMENTS TO BE PERFORMED

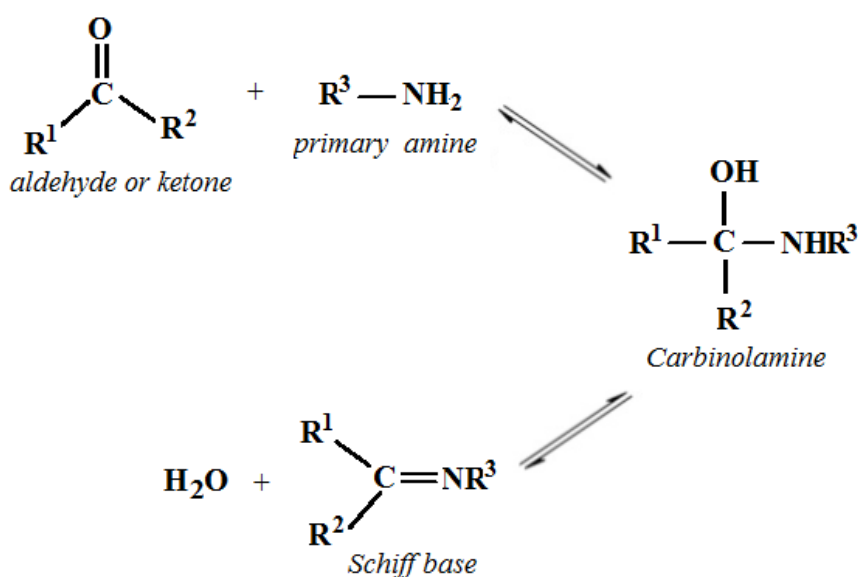
1. Ethylenediamine (en) + acetylacetonate (acac) + Nickel(II) chlorolride ($NiCl_2 \cdot H_2O$)
2. o-Phenylenediamine + salicylaldehyde (SAL) + Nickel(II) acetate ($NiAc_2 \cdot 4H_2O$)
3. Ethylenediamine (en) + salicylaldehyde (SAL) + Cupper (II) acetate ($CuAc_2 \cdot 4H_2O$)
4. t-Butyl amine + salicylaldehyde (SAL) + Cupper (II) acetate ($CuAc_2 \cdot 4H_2O$)

QUESTIONS

1. For all the experiments given above, write the reaction equations by specifying their open formulas.
2. Discuss the geometric structures of the complexes formed. By which methods can these structures be characterized?

GENERAL INFORMATION

The compounds that occur as a result of the condensation reaction of a carbonyl with an amine compound are called Schiff bases. Schiff bases are an important class of ligands containing carbon nitrogen double bonds in their structures. The carbon nitrogen double bond is called the azometin bond (-CH=N-). The carbonyl and amine compounds can carry a single functional group, as well as a larger number of functional groups. Schiff bases coordinate to metal ions via azomethine nitrogen.



In cases where R^1 , R^2 and R^3 are aromatic, if groups such as -OH, -NH₂, -OCH₃, -SH exist in the ortho state to the azometin (-CH=N-) bond, such Schiff bases can act as multifunctional ligands. Such ligands coordinate easily to metal ions with the help of lone pairs of electrons on the nitrogen atom of the azometin group or on the atoms of other bonded groups.

Schiff bases and their complexes are flexible compounds and extensively used for industrial purposes and also show a broad range of biological activities including antibacterial, antifungal, antiviral, antimalarial, antiproliferative, anti-inflammatory, anticancer, anti-HIV, anthelmintic and antipyretic properties. Many Schiff base complexes show excellent catalytic activity in various reactions and in the presence of moisture. The high thermal and moisture stabilities of many Schiff base complexes were useful attributes for their applications as catalysts in reactions involving at high temperatures. The influence of certain metals on the biological activity of these compounds and their intrinsic chemical interest as multidentate

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ligands has prompted a considerable increase in the study of their coordination behavior. Development of a new chemotherapeutic Schiff bases and their metal complexes is now attracting the attention of medicinal chemists.

The various synthesis procedures and application of Schiff bases and their metal complexes:

- 1. Schiff bases are an important class of ligands in coordination chemistry.*
- 2. Schiff bases are derived from the condensation reaction of aromatic/aliphatic aldehydes and amines and form stable complexes with different transition metal ions are still relevant to be of great interest in inorganic chemistry, although this topic has been extensively studied.*
- 3. Schiff bases and their metal complexes have been shown to be promising leads for both synthetic and structural research due to their relatively simple synthesis and structural diversity and have been widely investigated, due to their incredible chemical properties and applications in various areas.*
- 4. The chelating ability and biological applications of metal complexes have attracted remarkable attention and they can work as models for biologically important species.*
- 5. A number of Schiff bases containing the imino functionality have been shown to have a wide range of biological activities, including antibacterial, antifungal, antidiabetic, antitumor, antiproliferative, anticancer, anticorrosive and anti-inflammatory activities.*