

CHAPTER- II

CHAPTER - IIINTRODUCTION TO SYNTHESIS AND CHARACTERISATION OF REAGENT

Thiosemicarbazones usually react as Chelating ligands with transition metal ions by bonding through Sulphur and hydrazine nitrogen atoms although in few cases they behave as monodentate ligands and bond through the sulphur atom only.

Thiosemicarbazones have been frequently used for spectrophotometric determination of inorganic ions and their analytical potentialities have been reviewed^{1,2}. Metal thiosemicarbazone complexes have been found to be active against influenza³, protozoa⁴, smallpox⁵, tumors⁶ and pesticides⁷.

EXPERIMENTAL SYNTHESIS OF 6-METHOXY 2-CHLOROQUINOLINE
3-CARBALDEHYDE THIOSEMICARBAZONE:

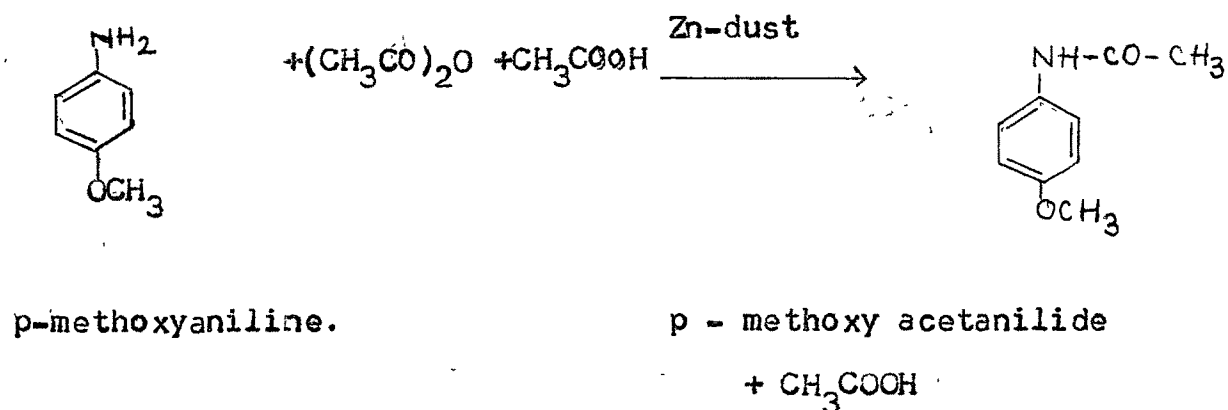
The synthesis of this reagent involves the following steps.

- (1) Preparation of p-methoxy acetanilide.
- (2) Preparation of 6-Methoxy -2-Chloroquinoline -
3- Carbaldehyde thiosemicarbazone.
- (3) Preparation of 6-Methoxy, 2-Chloroquinoline -
3 - Carbaldehyde thiosemicarbazone.



(1) PREPARATION OF P-METHOXY ACETANILIDE⁸:

In a 500 ml. round bottom flask, equipped with a reflux condenser, place 20.5 mgs. (20ml, 0.21 mol.) of p-methoxyaniline, 21.0 gms (20ml, 0.35 mol.) of glacial acetic acid and 21.5 gms. (20 ml., 0.21 mol.) of acetic anhydride and 0.1 gm of Zinc dust. Boil the mixture gently for 30 min. & then pour the hot liquid in a thin stream into 1 litre beaker containing 500 ml. of cold water with continuous stirring. When cold (it is preferable to cool in ice) filter the crude product at the suction pump. wash the product with little cold water, drain well and dry upon filter paper in the air. The yield of acetanilide was 26 gms. Upon crystallisation from about 500 ml. of boiling water to which about 10ml of industrial spirit had been added.

Reaction:

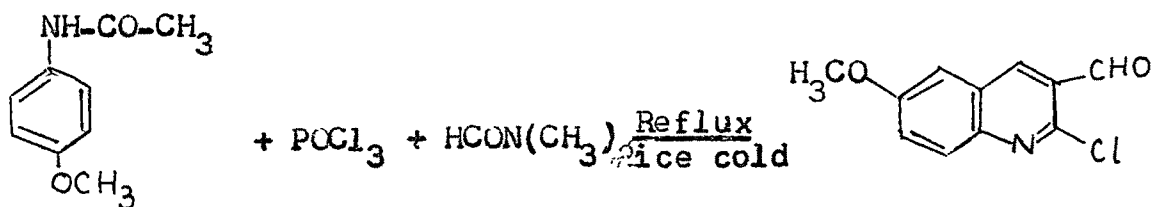
(2) PREPARATION OF 6-METHOXY 2-CHLOROQUINOLINE 3-CARBALDEHYDE:

6-Methoxy 2-Chloroquinoline 3-Carbaldehyde was prepared by standard method⁹ using Vilsmeier reagent as follows:

Dimethyl formamide (9.6 ml., 0.125 mol) was cooled to 0°C in a flask equipped with a drying tube (solid CaCl₂ in it.) and phosphoryl Chloride (53.7 gms., 32.2 ml, 0.35 mol.) was added dropwise with stirring. To this solution was added p-methoxy acetanilide (0.05 ml.) and after 5 mins. the solution was heated under reflux for the appropriate time (16 hrs.).

The reaction mixture was poured into ice water (300 ml.) and stirred for 30 mins. at 0.0°C. The 6-methoxy, 2-chloroquinoline, 3-Carbaldehyde was filtered off and washed with water (100 ml.) dried. Yield - 15 gms. The product was recrystallised from ethyl acetate.

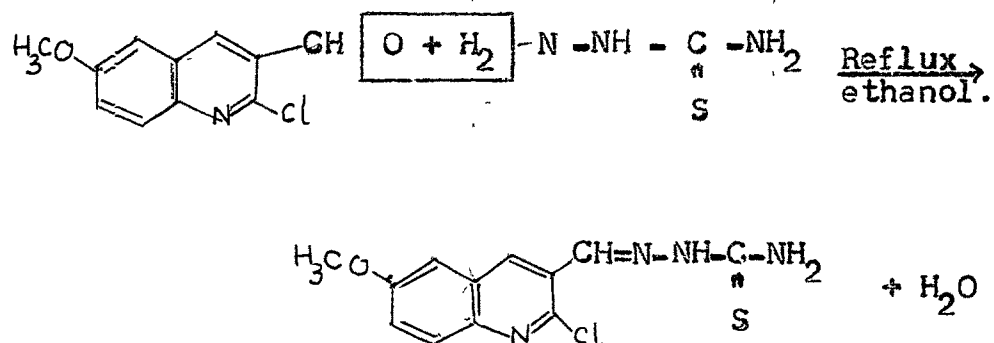
M.P. = 148.5°C.



6 - methoxy, 2-Chloroquinoline
3 - Carbaldehyde.

(3) PREPARATION OF 6-METHOXY, 2- CHLOROQUINOLINE,
3- CARBALDEHYDE THIOSEMICARBAZONE:

6 - Methoxy, 2-Chloroquinoline, 3-Carbaldehyde thiosemicarbazone was prepared by refluxing equimolar quantities of 6- Methoxy, 2-Chloroquinoline, 3-Carbaldehyde and thiosemicarbazone in minimum quantity of ethanol for 1 hour. The yellow crystalline product was obtained, which was washed with dist. water, ether and finally with ethanol. It was recrystallised from ethanol: (M.P. 165°C).



6- Methoxy, 2 - Chloroquinoline 3 - Carbaldehyde
thiosemicarbazone.

CHARACTERISATION OF 6- METHOXY, 2 - CHLORO
QUINOLINE 3-CARBALDEHYDE THIOSEMICARBAZONE:

6 - methoxy, 2 - Chloroquinoline, 3 - Carbaldehyde thiosemicarbazone is stable in air. There is no action of light on the reagent. So no special care is to be taken to protect it from light.

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The microelemental analysis of the purified reagent confirmed the formula - $C_{12}H_{11}N_4ClSO$. Calculated percentage of the elements present in the reagent are C = 49 %, H = 3.8%, N = 19 %.

Experimentally found percentage of the elements in the reagent are C = 48.72%, H = 3.67%, N = 18.92%.

The reagent is soluble in Dimethyl formamide and is sparingly soluble in ethyl acetate, alcohol, acetone. It is insoluble in cold water, Chloroform, Carbontetrachloride.

ABSORPTION SPECTRA OF THE REAGENT:

The absorption spectra, 6- Methoxy, 2-Chloroquinoline, 3- Carbaldehyde thiosemicarbazone in D.M.F. + Water (3:2) solution of pH = 6 and pH=5 are shown in fig. 2.1. The absorption curves exhibit strong absorption band at 390nm. with molar extinction coeff. of $0.3053 \times 10^3 \text{ Mole}^{-1}\text{Cm}^{-1}$ and $0.2785 \times 10^3 \text{ Mole}^{-1}\text{Cm}^{-1}$ at pH 6 & 5 respectively.

OTHER REAGENTS:

Reagent grade chemicals were used for preparing the solutions required for the study. Common cations used were sodium or ammonium salts and common anions were Chlorides, nitrates, Sulphate.

PREPARATION OF BUFFER SOLUTIONS

The buffer solutions of pH 1 to 10 were prepared by the following procedure:

pH Composition of the mixture

- 1) 47.5 ml. of $\frac{N}{5}$ HCl + 25 ml. $\frac{N}{5}$ KCl. & dilute to 100 ml.
 - 2) 5.3 ml. of $\frac{N}{5}$ HCl + 25 ml. $\frac{N}{5}$ KCl. & dilute to 100 ml.
 - 3) 20.55 ml. of $\frac{N}{5}$ Na₂HPO₄ + 79.45 ml. of $\frac{N}{10}$ Citric acid.
 - 4) 41.0 ml. of 0.2 M CH₃COOH + 9 ml. of 0.2N CH₃COONa.
 - 5) 14.75 ml. of 0.2 M CH₃COOH + 35.25 ml. CH₃COONa (0.2 M).
 - 6) 9 ml. of 0.2 M CH₃COOH + 191.0 ml. of 0.2 M CH₃COONa.
 - 7) 12 ml. of 0.05 M borax + 188 ml. solution containing 12.40 gm. boric acid and 2.93 gm. of NaCl in 1 lit.
 - 8) 11 ml. of 0.05 m borax + 29 ml. solution containing 12.30 gm. boric acid & 2.93 gm. of NaCl in 1 lit.
 - 9) 40 ml. of 0.05 M boax + 10 ml. Solution containing 12.40 gm. boric acid and 2.93 gm. of NaCl in 1 lit.
 - 10) Equal parts of 0.25 N NaHCO₃ + 0.025 N Na₂CO₃.
- 4.5 Dissolve 13.7 gm. of pure sodium acetate trihydrate and 6.0 ml. of glacial acetic acid. in water and dilute to 100 ml.
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APPARATUS:

All the spectral measurements over visible region were done on a Carl Zeiss grating spectrophotometer spekol by using 10 mm matched pair of glass cuvettes & spectronic 20 D spectrophotometer. For the measurements of pH values Philips pH meter PR 9405 was used. Standard phthalate buffer (0.05 M) was used for the standardisation of the pH meter.

TABLE : 2.1
ABSORPTION SPECTRA OF 6 Meo-QAT

At pH = 6		At pH = 5	
Wave length (nm)	Absorbance	Wave length (nm)	Absorbance
350	0.467	350	0.460
360	0.482	360	0.475
370	0.510	370	0.490
380	0.535	380	0.505
390	0.570	390	0.520
400	0.525	400	0.500
410	0.470	410	0.470
420	0.430	420	0.455
430	0.365	430	0.435
440	0.325	440	0.400
450	0.295	450	0.340
460	0.265	460	0.295
470	0.250	470	0.260
480	0.200	480	0.245
490	0.190	490	0.175
500	0.165	500	0.150
510	0.145	510	0.120
520	0.125	520	0.115
530	0.110	530	0.095
540	0.090	540	0.080
550	0.0875	550	0.070
560	0.0850	560	0.060
570	0.0845	570	0.045
580	0.0840	580	0.045
590	0.0840	590	0.0435
600	0.0835	600	0.0430
610	0.0830	610	0.0425
620	0.080	620	0.0425
630	0.080	630	0.0420
640	0.0795	640	0.0415

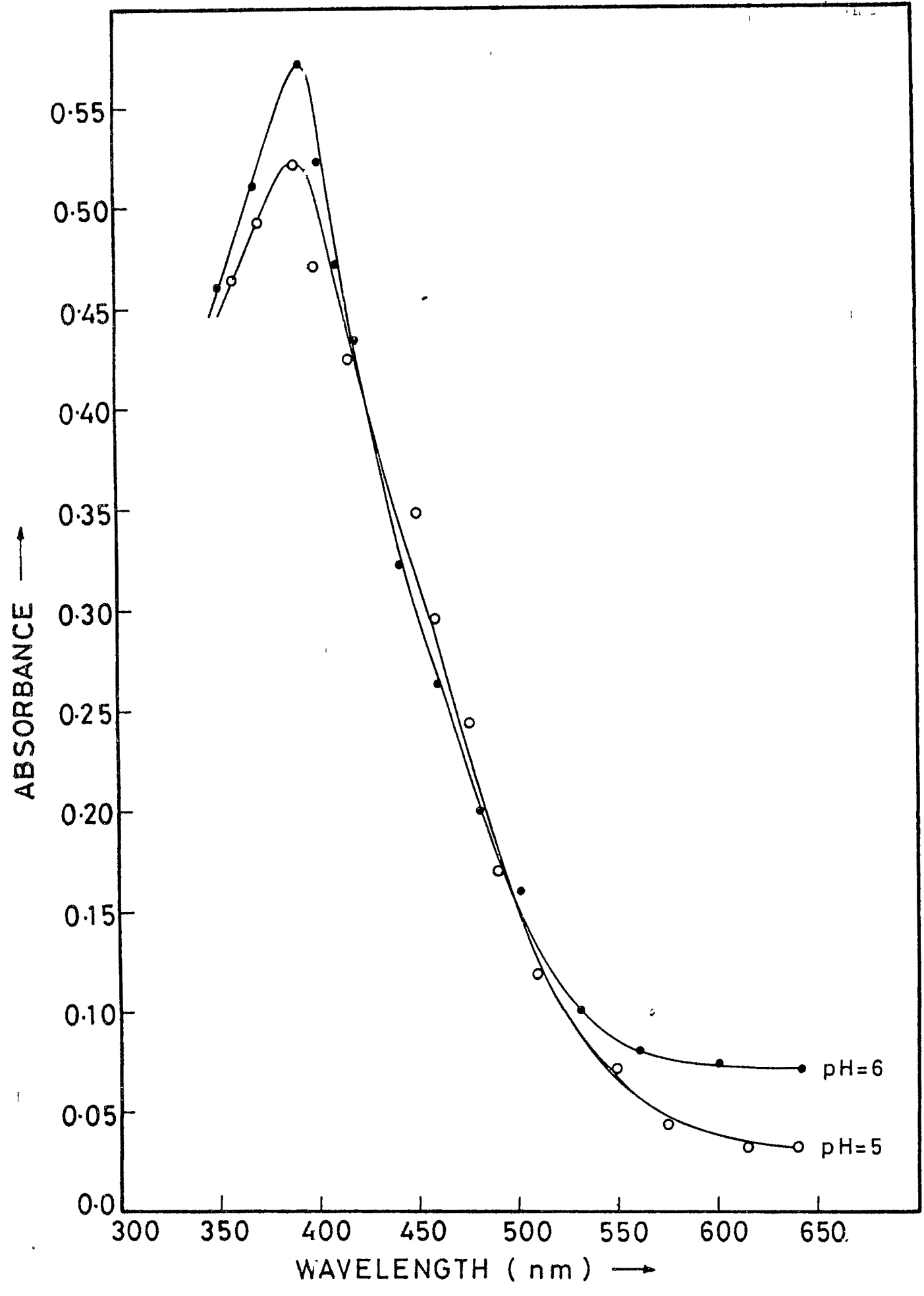


FIG. 2.1 - ABSORPTION SPECTRUM OF LIGAND.

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