CHAPTER-I

SYNTHESIS OF REAGENT AND THEIR CHARACTERISATION.

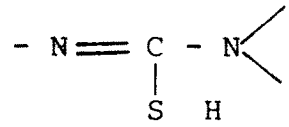
1-(4'-Bromophenyl)-4,4,6-Trimethyl (1H,4H)-2-Pyrimidinethiol.

abbreviated as 4'-BromoPTPT

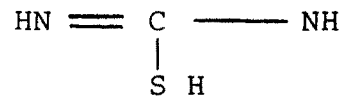
SYNTHESIS AND CHARACTERISATION OF 4'-BROMO-PTPT

INTRODUCTION

2-Mercaptopyrimidines is a class of compounds known to be cylicthioureas. These are obtained by condensation of isothiocyanates with amines as a fine crystalline compounds. The active grouping for chelation as shown



is analogous to the grouping in thiourea in thiol[1] form such as



The Mercaptopyrimidines act as a chelating agent for metal ions by bonding through S atom, sometimes N atom or possibly both jointly[2]. In most of the cases they behave as unidentate ligand by complexation through S atom of thiol group[3].

The first analytical application of this class of compounds was made by Singh et al as selective spectrophotometric reagents for the determination of some platinum group metals[3-6]. The analytical aspects of chemistry of substituted mercaptopyrimidines was also reviewed by Singh et al[7]. However, the use of such compounds as extractants for platinum group metals and Gold has been reported for the first time in this laboratory[8-10]. The literature as well as our investigations on the use of mercaptopyrimidines in the extraction, sepration and

determination of Noble metals in particular revealed that the thioligands possess a fascinating analytical potentialities. This prompted us to undertake the studies on synthesis of thioligands with bromo-phenyl substituent at position 1 of mercaptopyrimidine moeity. With improved mithod for synthesis of mercaptopyrimidines by Mathes, a large number of compounds, their derivatives and the analytical utilities in the extractive photometric determination have been recently reported.

like hetrocyclicthiols, mercaptopyrimidines have been shown to be useful as vulcanization accelerators[11]. The compounds are biologically important as they have been reported to have antibacterial activity[12-13]. A number of papers have appeared on pharmacology of these compounds. Derivatives of pyrimidinethiols have been reported as antiwear additives for lubricating oils, photographic adjucants[14-15]. There is a report in the use of these compounds as an intermediate in the preparation of fungicidal compounds[16].

SYNTHESIS OF 1-SUBSTITUTED PYRIMIDINETHIOL

1-(4'-bromo phenyl)-4,4,6-trimethyl-(1H,4H)-pyrimidine-thiol was prepared by the method of Mathes[17-20]. The synthesis was carried out in two steps. In the first step, 2-methyl-2-isothiocyanato-4-pentanone was prepared according to Bruson[21], while in the second step the product was condensed with p-bromoaniline to obtain 4'-bromo-PTPT.

A) Synthesis of 2-methyl-2-isothiocyanato-4-pentanone :-

49.0 g (0.5 mole) of sulphuric acid dissolved in 50 ml of water was added over a period of 15 min to 98 g(1 mole) of mesityl oxide at 15° . 76 g (1 mole)of ammonium thiocyanate dissolved in 100 ml of water was added quite rapidly to this mixture at room temperature. After stirring for 15 min the upper red, oily layer was separated and was washed with water until free from acid. The compound was dried by keeping it with anhydrous sodium sulphate for over night.

Yield = 80%

Anal. calculated for $C_{17}H_{11}NOS$

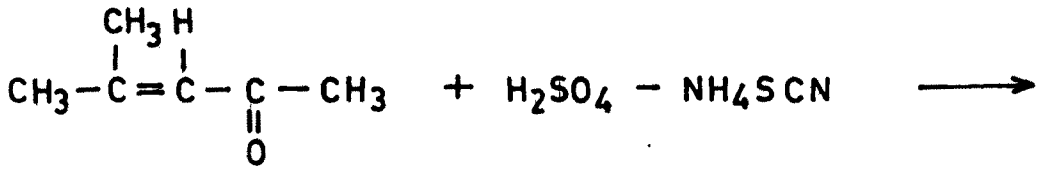
$C_{17}H_{11}NOS$: C,53.51; H,7.00; N,8.91; O,10.2; S,20.38.

Found : C,53.48; H,7.06; N,8.9; O,10.18; S,20.38.

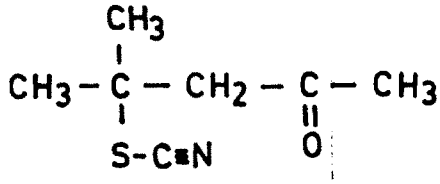
B) Synthesis of 1-substituted mercaptopyrimidines (4'-bromo-PTPT) from, 2-methyl-2-isothiocyanato-4-pentanone and p-bromoaniline :-

To synthesise 4'-bromo-PTPT, 2-methyl-2-isothiocyanato-4-pentanone(3.14g, 0.02 mole) was mixed with 4'-bromoaniline (3.44 g, 0,02 mole) dissolved in 50 ml ethanol. 15-25 drops of conc H_2SO_4 were added to the reaction mixture. The mixture was refluxed for 20-25 min and cooled. The crystalline product precipitated. The product was recrystallised from glacial acetic acid, washed with water and air dried. The compound is colourless with sharp M.P. 188° and practical yield obtained was 68%.

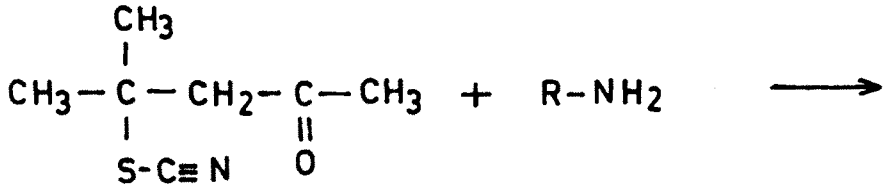
Reactions :—

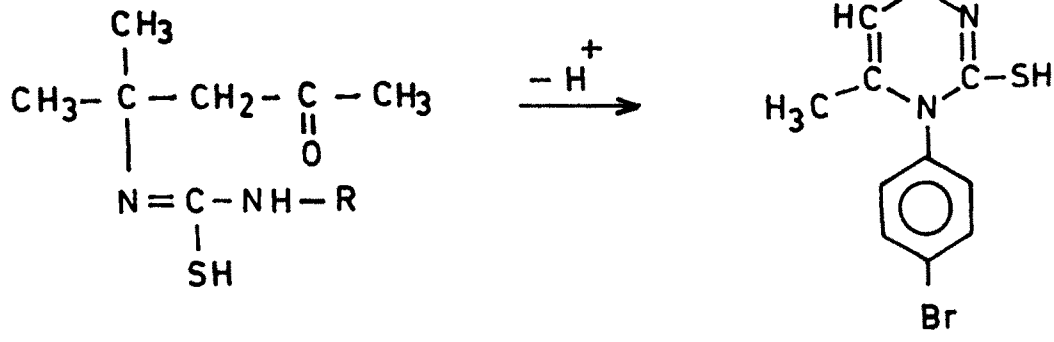


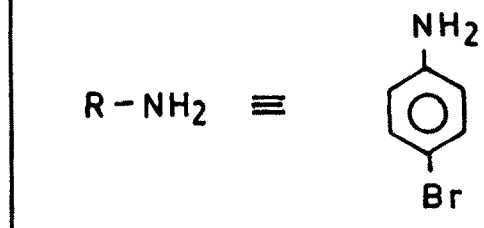
Mesityl Oxide



2- Methyl - 2 - isothiocyanato - 4 - pentanone







1 - (4' - Bromophenyl) — 4,4,6 - trimethyl (1H, 4H) - 2 - pyrimidinethiol .

Molecular formula of resultant compound is $C_{13}H_{15}N_2SBr$, Mol. Wt. 311.

Anal. calculated for $C_{13}H_{15}N_2SBr$

$C_{13}H_{15}N_2SBr$:	C,50.17;	H,4.82;	N,9.0;	S,10.29;	Br,25.72
Found :	C,50.20;	H,4.86;	N,8.9;	S,10.30;	Br,25.74

Properties of 4'-bromo-PTPT :-

The pyrimidinethiol is colourless fine crystalline, shining solid with a sharp M.P. 188° . The compound is soluble in chloroform, DMF, DMSO and dioxan. It is insoluble in water and sparingly soluble in ethanol, acetone and MIBK. Its solution in DMF, chloroform, ethanol and DMSO is stable at room temperature for about 48 hours and hence does not need protection from light.

Determination of purity of 4'-bromo-PTPT :-

Aromatic thiols are much more acidic than corresponding phenols, hence, the thiol group as an acid has long been determined titrimetrically by several authors[22-23] . The purity of pyrimidinethiol was determined by non-aqueous titration of the thiol group using Azo-violet (p-nitrophenyl-azoresorcinol) indicator, according to the method of Verma[24] .

EXPERIMENTAL

Reagents :-

Sodium methoxide solution -

0.05 M Sodium methoxide in benzene-methanol was prepared as described by Fritz and Lisicki[22] & standardised against benzoic acid in acetone using Victoria Blue as an indicator.

Indicator -

0.1% solution of Azo-violet in acetone was used.

Procedure -

A solution of 4'-bromo-PTPT containing 20-25 mg in 25 ml of DMF was prepared. The appropriate aliquots were taken for titration with 0.05 M sodium methoxide by using 3-4 drops of the indicator solution. The colour change was from red to blue.

The results of the purity carried out in the triplicate analysis indicate that the compound is 99.9% pure. The overall standard deviation calculated from the pooled data for 20 mg of the compound used was 0.02 mg.

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