

## Preparation of some soluble Schiff- bases derived from zinc phthalocynine compounds

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### Abstract

A Schiff- base of aminophthalocynine with benzaldehyde and p-methyl benzaldehyde were prepared and characterized spectroscopically. Their electrical properties were also studied. The study shows that the conductivities of the Schiff- bases are less than that of aminophthalocynines.

**Key words:** peripheral substituted zinc phthalocynine, Schiff- bases, electrical conductivity.

### Introduction

Peripherally unsubstituted phthalocynine are practically insoluble in common organic solvents. The introduction of bulky substituents in the peripheral position of the macrocycle drastically increases their solubility in organic solvents<sup>(1)</sup> which extend actual and potential field of their technology.

Tetra and octa substituted phthalocynines<sup>(2)</sup> have been intensively studied which show that tetra substituted macrocycle exhibit a higher solubility than octasubstituted derivative<sup>(3)</sup>.

The spectral and electrochemical properties of phthalocynines are strongly influenced by peripheral substituents on the macrocycles. Recent studies show interesting optical and electrochemical properties<sup>(4,5)</sup>.

We report here for the first time the synthesis of tetra substituted Schiff-bases of tetra aminophthalocynines with benzaldehyde and p-methyl benzaldehyde which show some interesting properties with high solubility compared to phthalocynines with unsubstituted.

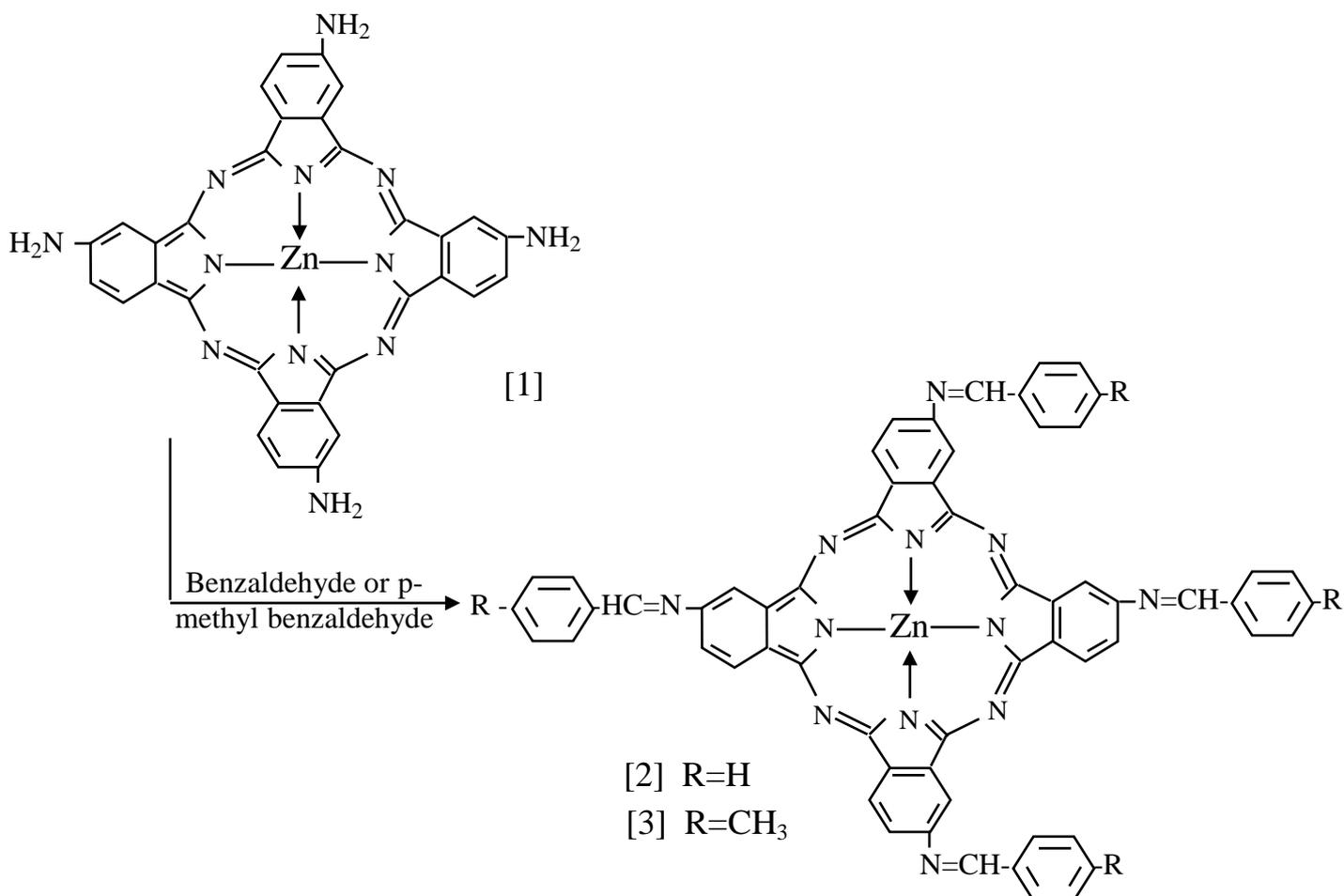
The soluble phthalocynines have an important practical electrical applications, since they are easily purified and processed<sup>(6)</sup>.

### Experimental

The Schiff bases (4-Ph CH=N)<sub>4</sub> Pc Zn [2] and (4-P-CH<sub>3</sub>Ph CH=N)<sub>4</sub> Pc Zn [3] were prepared according the reaction of (4-NH<sub>2</sub>)<sub>4</sub> Pc Zn .2H<sub>2</sub>O [1] with benzaldehyde and p-methyl benzaldehyde respectively. Compound [1] was prepared according to the references (5,7) C.H.N. analysis (calcd ; C: 57.05 , N: 24.96 , H: 3.56 ; found C: 56.71 , N: 25.72 , H: 3.01) .Compounds [2] & [3] were prepared as follows: 1gm (0.0015 mole) of compound [1] was refluxed with 15 ml(excess) of benzaldehyde or p-methyl benzaldehyde respectively for 3 hours , then the product was cooled and poured in to cold water , filtered and recrystallised from ethanol , the products were 0.91 g ( 65%) from compound [2] or 0.94g (62 %) from compound [3] ,they are both polycrystalline greenish-yellow compounds .

The compounds were then characterized by I.R. spectroscopy using FT.IR.8400 S from Shimadzu Company and by U.V./visible spectroscopy using Cintra 5 U.V./visible spectrometer.

The electrical properties were studied using the D.C. electric circuit as in references (5,7) under vacuum of  $1 \times 10^{-3}$  Torr and at temperature range of (283 – 373 Kelvin).



## Result & Discussion

The I.R. spectrum of the compound [1] shows the characteristic appearance as in reference (5, 7). The spectrum shows also the N-H stretching vibration at  $3305 \text{ cm}^{-1}$  and  $3320 \text{ cm}^{-1}$  (W) (sym and assym), C=C and C=N stretching at  $1490 \text{ cm}^{-1}$  and  $1600 \text{ cm}^{-1}$  respectively, C-N stretching at  $1228 \text{ cm}^{-1}$ , C-H aromatic bending at  $1145 \text{ cm}^{-1}$  and  $775 \text{ cm}^{-1}$ .

The U.V. – visible spectrum of compound [1] in DMSO shows the characteristic bands as in the previous references with Q- band at 736nm and B-band at 360nm<sup>(6)</sup>.

The IR spectra of the new compounds shows the new aliphatic C-H stretching at  $2900\text{-}2800 \text{ cm}^{-1}$  (fig. 1).

The U.V. – visible spectra in DMSO show the disappearance of the Q- bands from their positions in the measured rang with an appearance of a band at 404 nm and 400 nm for compounds [2] and [3] respectively (fig. 2). This strange behaviors has also been found in Mn(II) and UO<sub>2</sub> phthalocyanines compounds where the Q-bands appear near I.R. at around 830- 880 nm<sup>(8)</sup>.

The Schiff bases have higher decomposition temperatures (>350 C) than the amino compound, where the amino compound started to decompose before the Schiff base compounds.

In addition they show a good solubility in many solvents such as ethanol, methanol which is an important property for purification and application purposes as semiconductors.

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The electrical properties of the prepared compounds (fig.3) show the D.C.conductivity ( $\sigma$ ) sequence as follows:

$$\sigma [1] > \sigma [3] > \sigma [2].$$

The low conductivity of the Schiff bases [2] & [3] is compared to the amino compound may be due to the presence of the big side substituted groups which reduce the packing efficiency of the phthalocynine ring which then reduce the crystallization of the compounds<sup>(6)</sup>.

The higher conductivity of the compound [3] in compared to the compound [2] is due to the presence of the donor  $\text{CH}_3$  group, which increase the electron density on the phthalocynine ring<sup>(6,9)</sup>.

**Fig: (1) I.R. spectrum of compound [3]**



Fig: (2) UV – visible spectrum of compounds [1] and [2]

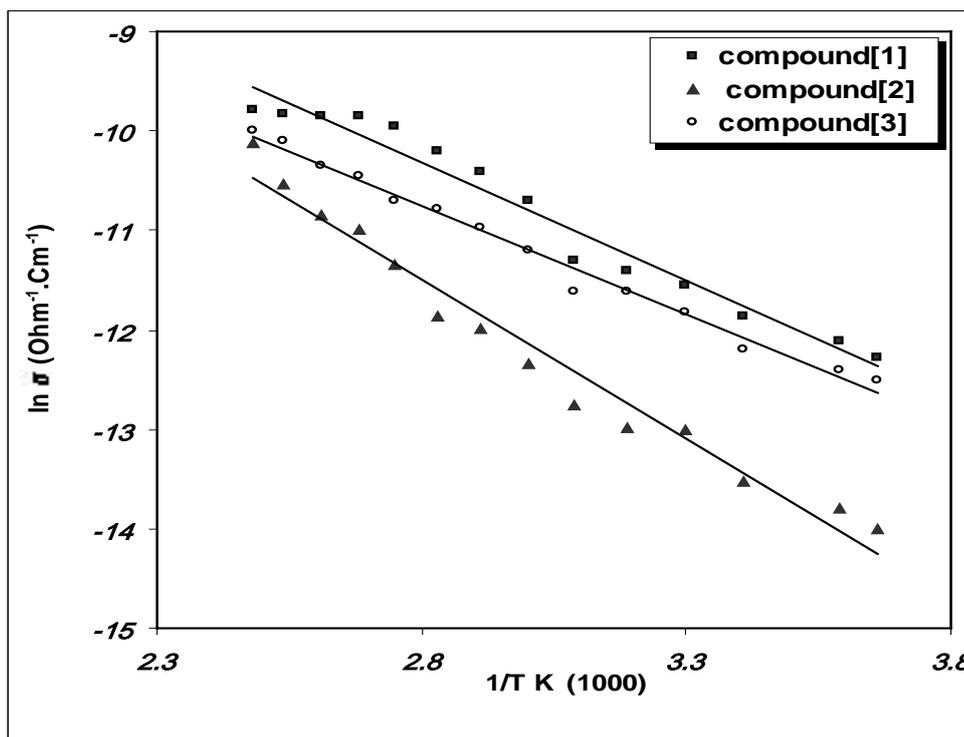


Fig: (3) D.C.conductivity of compounds [1],[2] and[3]

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### تحضير بعض قواعد شف الذائبة والمشتقة من مركبات فثالوسيانين الزنك

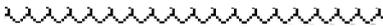
نزار عبد الأمير حسين ، داوود سالم عبد ، رافد حميدان الاسدي

فزلطقي تي ليد؟ / فكي بطكته تي بـ

جـ لـع بطكها شـبـ طـكـها شـبـ طـكـصـفـ

على خيال شديد:

حضرت قواعد شف من مركبات الفثالوسيانين الأمينية مع البنزليدهايد والبارا-مثيل بنزليدهايد وشخصت طيفياً. درست الصفات الكهربائية لقواعد شف ووجد إن توصيليتها أقل من مركبات الفثالوسياتين الأمينية.



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