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**ORIGINAL ARTICLE**

# SYNTHESIS, CHARACTERIZATION, BIOLOGICAL EVALUATION AND ANTI-CORROSION ACTIVITY OF SOME NEW SHIFF BASES DERIVATIVES CONTAINING PIPERIDONE-4

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**ABSTRACT**: A new Shiff base were synthesis by the reaction of 2,6-bis (4-chlorophenyl) pipridone-4 with benzidine in ratio (2:1) and reaction of 3,5- dimethyl-2,6- diphenyl piperidone-4 with 1,2-Phenylendiamine and 2-aminobenzenethiol in ratio (1:1). All synthesized compound were characterized by melting point, elemental analysis, Ms, FT-IR, one–dimensional NMR ($^{1}H$&$^{13}C$) spectroscopic data and evaluated for their *in vitro* antibacterial activities, against Gram positive (*Staphylococcys aureus*) and Grame negative (*Escherichia.coli, Enterobacter, Salmonella, Klebsiella*) bacteria. The synthesized compounds were tested to determine their ability to inhibit corrosion of mild steel in 1 mol.$L^{-1}$ $H_2SO_4$ and measured by polarization measurements and X-ray diffraction.

**KEYWORDS:** Piperidone-4, Schiff Bases, Antibacterial Activities, Anti-Corrosion Activities, Polarisation, X-Ray Diffraction.

## INTRODUCTION

Research and development of potent and effective antimicrobial agents represents one of the most important advances in therapeutics, not only in the control of serious infections but also in the prevention and treatment of some infections, but also in the prevention and treatment of some infectious complications of other therapeutic modalities such as cancer chemotherapy and surgery. Over the past decade, fungal infection became an important complication and a major cause of morbidity and mortality in immune-compromised individuals such as those suffering from tuberculosis, cancer or AIDS and in organ transplant cases (Turan-Zitouni *et al.,* 2005) piperidines are an important group of heterocyclic compounds in the field of medicinal chemistry owing to the fact that these can frequently occurring alkaloid and synthetic compounds with interesting biological and pharmacological properties, piperidones were also reported to possess analgesic (Richardo *et al.,* 1979), anti-inflammatory (Jerom and Spencer, 1988), central nervous system (CNS) (Perumal *et al.,* 2001), local anaesthetic (Bochringer and Shochne, 1961), anticancer (Ganellin and Spickett, 1965) and antimicrobial activity (Nikolov *et al.,* 1974; Mobio *et al.,* 1985).
Schiff bases are used as substrates in the preparation of a number of industrial and biologically active compounds via closure, cycloaddition and replacement reaction. Moreover, Schiff bases are also known to have also been employed as ligands for complexation of metal ions. On the industrial scale, they have a wide range of applications such as dyes and pigments (Toggi *et al.,* 2002).
Benzimidazoles are remarkably effective compounds both with respect to their inhibitory activity and their favorable selectivity ratio. Extensive biochemical and pharmacological studies have confirmed that benzimidazole molecules are effective against various strains of microorganisms (Kazimierczuk *et al.,* 2002). Benzimidazoles are regarded as a promising class of bioactive hetercyclic compounds that exhibit a range of biological activities. Specifically, this nucleus is a constituent of vitamin-$B_{12}$ (Oniel *et al.,* 2001). This ring system is present in numerous antioxidant, anti-parasitic (Navarrete *et al.,* 2001), anti-helminthic (Ravina *et al.,* 1993), anti-proliferative and anti HIV activities (Rao *et al.,* 2002).
It is a known fact that mild steel, the material of choice in many industries, undergoes corrosion in acid medium. Efforts are taken worldwide to control the corrosion, Organic compounds containing N,O,S, and P as heteroatoms or those containing multiple bonds function as good inhibitors, piperidones have been found to inhibit acid corrosion of mild steel (Raja *et al.,* 2010; Ozcan, 2008; Quraishi, 2001; Solmaz *et al.,* 2008; Mernari *et al.,* 1998).

## MATERIALS AND METHODS

*2.1. Measurements*

Melting points were determined in open glass capillaries on agallenkamp apparatus and are uncorrected. TLC was performed to assess the reactions and the purity of the products. IR

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spectra were recorded in KBr (pellet forms) on aNicolet-Avatar-330 FT-IR spectrophometer and noteworthy absorption values ($cm^{-1}$) alone are listed. $^{1}H$ and $^{13}C$ NMR Spectra were recorded at 400 $MH_Z$ Bruker AMX using $CDCl_3$ as solvent. The ESI+ve MS spectra were recorded on a Bruker Daltonics LC-MS Spectrometer. Satisfactory microanalysis was obtained on carlo Erba 1106 CHN analyzer. potantiostat–galvanostat from Amel instruments where used for corrosion activity.

All the starting materials and reagents were of high–grade purchased from Aldrich, Fluka and Merck. All of the solvent were distilled prior to use. The general synthetic scheme of the novel compounds 2,4,5 is furnished in Figures 1 and 2. 2,6-Diarylpiperidone-4 (1,3) were prepared by the condensation of appropriate ketone, aldehydes and ammonium acetate in 1:2:1 ratio (Noller *et al.*, 1948).

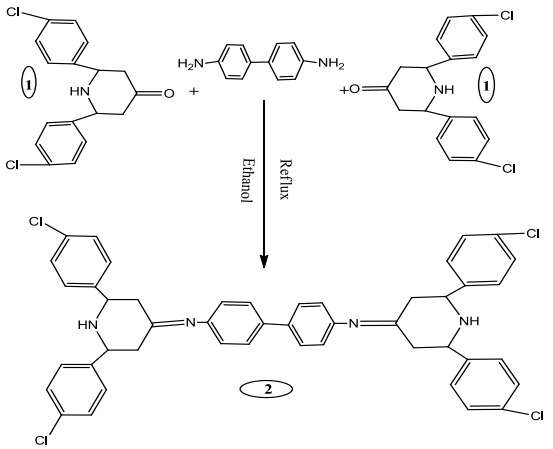


**Figure 1:** Synthetic protocol to synthesis compound (2).

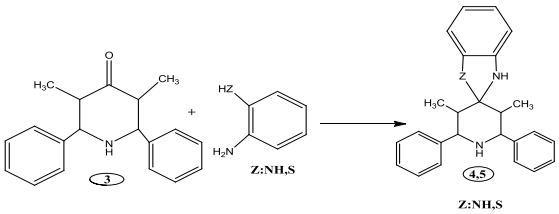


**Figure 2:** Synthetic protocol to synthesis compound (4,5).

*2.2. General synthesis procedure for compound (2,4,5)*

*2.2.1. Synthesis of N,N'-bis(2,6-bis(4-chlorophenyl)piperidin-4-ylidene)-[1,1'-biphenyl]-4,4'-diamine (2)*

To a mixture of benzidine (1.84gr,0.01mol) and 2,6-bis (4-chlorophenyl) piperidone-4 (6.4gr,0.02mol) dissolved in ethanol one drop of concentrated sulphuric acide was added. The reaction mixture was refluxed for 10h. The reaction was monitored by TLC. The reaction mixture was then poured into crushed ice. Separated solid was filtered dried and recrystallized from ethanol and water to give (N,N'-bis(2,6-bis(4-chlorophenyl)piperidin-4-ylidene)-[1,1'-biphenyl]-4,4'-diamine), The physicochemical data for synthesized Schiff base are given in Table 1.

**Table1:** Physicochemical data of synthesis compounds.

| Compound NO. | Molecular formula | Molecular Weight | MP ($^0$C) | Yield (%) |
|---|---|---|---|---|
| 1 | $C_{17}H_{15}Cl_2NO$ | 320 | 260 | 70% |
| 2 | $C_{46}H_{38}Cl_4N_4$ | 788 | 218 | 80% |
| 3 | $C_{19}H_{21}NO$ | 279 | 139-140 | 96% |
| 4 | $C_{25}H_{26}N_2S$ | 386 | 88 | 86% |
| 5 | $C_{25}H_{27}N_3$ | 369 | 128 | 79% |

*2.2.2. Synthesis of 3',5'-dimethyl-2',6'-diphenyl-3H-spiro[benzo [d]thiazole-2,4'-piperidine] (4)*

A mixture of 3,5-dimethyl-2,6-diphenylpiperidin -4-one(2.79gr,0.01mol) and o–aminobenzenethiol (1.084 gr, 0.01 mol) in 20ml ethanol was heated under reflux for 24h. Then the solvent was reduced to one third its volumes under pressure and then cooled poured into crushed ice. Separated solid was filtered dried and recrystallized from ethanol and water togive3',5'-dimethyl-2',6'-diphenyl-3H-spiro [benzothiazole-2,4'-piperidine], The physicochemical data are given in Table 1.

*2.2.3. Synthesis of 3',5'-dimethyl-2',6'-diphenyl-1,3-dihydro spiro[benzo[d]imidazole-2,4'-piperidine] (5)*

A mixture of 3,5-dimethyl-2,6-diphenylpiperidin-4-one(2.79gr,0.01mol) and o-phenylenediamine (1.084 gr, 0.01 mol) in 20ml ethanol was heated under reflux for 24h. Then the solvent was reduced to one third its volumes under pressure and then cooled poured into crushed ice. Separated solid was filtered dried and recrystallized from ethanol and water togive3',5'-dimethyl-2',6'-diphenyl-3H-spiro [benzothiazole-2,4'-piperidine] ,The physicochemical data are given in Table 1.

*2.3. Biological Activity*

The newly synthesized compounds were screened for their antibacterial activity against Escherichia *coli, Staphylococcus aureus, Klebsiella, Salmonella, Pseudomonas, Enterobacte*r using disk-diffusion method (Cruickshank *et al.*, 1975). Disks measuring 6.25 mm in diameter were punched from Whatman no.1 filter paper. Batches of 100 disks were dispensed to each screw-capped bottle and sterilized by dry heat at 140$^0$ C for an hour. The test compounds were prepared with different

concentration using DMSO. Disks of each concentration were placed in triplicate in nutrient agar medium seeded with fresh bacteria separately. The incubation was carried out at 370C for 24h.

*2.4. Anti-corrosion Activity*

*2.4.1. Electrochemical Measurements*

Electrochemical measurements were carried out in conventional three–electrode system in CHI 604 instrument (USA) at 303 K. The working electrode (mild steel) has a geometric area of 1 $cm^2$. The saturated calmmel and platinum electrodes were used as reference and auxiliary electrodes. Equation (1) shows the calculation of IE from corrosion current:

$$IE = \left(1 - \frac{icorri}{icorr0}\right) \times 100 \qquad (1)$$

*2.4.2. XRD Measurements*

The diffraction patterns of brightly polished mild steel surface and film formed by inhibitor over the surface of mild steel were examined after 24h using inel XRD INSTRUMENT (Artenary, France).

## RESULTS AND DISCUSSION

*3.1. Synthesis*

The structures of synthesized compounds were confirmed by IR, elemental analyzer (CHNS), MASSand $^1$H, $^{13}$C-NMR spectroscopy methods (Table 2). The synthetic procedure adopted to obtain the target compounds are depicted in Figures 1 and 2. The most characteristic FT-IR bands of compound (1,3) appeared at (1702.57 $cm^{-1}$) (C=O) which disappeared in the spectrum of compound (2,4,5) with new bands appeared at (1621.38 $cm^{-1}$ due to (C=N) in compound (2) and bands appeared at (1603.09 $Cm^{-1}$) due to (C-N). $^1$H-NMR Spectrum of compound (2) showed multiple peaks at (7.54,7.65 ppm) due to Aromatic protons of Benzidine. $^1$H-NMR Spectrum of compound (4) showed multiple peaks at (6.43,7.01,7.09 ppm) due to aromatic protons of benzene Aromatic of aminobenzethiol and single peak at δ: 3.33 ppm due to proton of (NH) of spiro [benzothiazole]. $^1$H-NMR Spectrum of compound (5) showed multiple peaks at (7.29 ppm) and (7.33 ppm ) due to Aromatic proton of dihydrospiro [benzoimidazole]. $^{13}$C-NMR spectrum of compounds (2,4,5) show no signals in the C=O range at (δ: 211.23 ppm) and show signal at (187.9 ppm) due to (C=N) for compound (2) and signal at (87.58 ppm) due to (C-4 ) for compound (4) and signal at (86.94 ppm) Due to (C-4) for compound (5). Signals in $^{13}$C-NMR spectrum of compound (2) at (δ: 122.8, 129.2, 139.3, 149.5 ppm) due to carbons of aromatic benzene rings of benzidine signals in $^{13}$C-NMR spectrum of compound (4) at (δ: 115.26, 116.52, 131.60, 135.83, 150.21) due to carbons of aromatic ring of [benzothiazole], signals in $^{13}$C-NMR spectrum of compound (5) at (δ: 108152.78) due to carbons of aromatic ring of benzoimidazole.

**Table2:** Spectroscopial data of synthesis compounds

| Compound No. | Spectroscopy data |
|---|---|
| 1 | **IR**: 3308.29$cm^{-1}$ (N-H), 2977.82$cm^{-1}$ ($CH_2$ asymmetric), 2885.27$cm^{-1}$ ($CH_3$vibration), 2825.80$cm^{-1}$ ($CH_2$ symmetric) 2792.30$cm^{-1}$, ($CH_2$ stretching), 1702.57$cm^{-1}$ (C=O), 1455.40 $cm^{-1}$ ($CH_2$scissoring), 1332.38$cm^{-1}$ ($CH_2$ wagging), 1275.27$cm^{-1}$ (C-H bending), 1143.03$cm^{-1}$ (bending N-H,OOP), 758.96 $cm^{-1}$, 697.65 $cm^{-1}$ (C-HAr bending out of plane), 670.42 $cm^{-1}$ (C-(C=O)-C Planar bending).<br>**MS**: m/e: 279(P,25.45%), 222(10.30%), 194(88.4%), 133(45.4%), 146(26.06%), 165(7.87%), 118(100%), 106(39.39%), 91(44.24%), 77(24.84%), 65(13.93%), 51(16.6%), 39(15.75%).<br>**$^1$H-NMR** ($CDCl_3$,400MHZ): $\delta_H$/PPm: 0.84(d,6H,2$CH_3$,$^3$J=6.56Hz), 2.19 (s,1H,NH), 2.82(m,2H,CN-C<u>H</u>-$CH_3$,$^3J_{H2H3}$:7.57Hz,$^3J_{H2HCH3}$; 6.821Hz), 3.63 (d,2H,NH-C<u>H</u>-Ar,$^3J_{H2H3}$:7.95Hz), 7.32-7.48 (m,10H,Ar,,$^2$J:6.56Hz).<br>**$^{13}$C-NMR:(**$CDCl_3$,400MHZ): δ/PPm:10.53(2$CH_3$), 52(C-3,C-5), 68.90(C-2,C-6) 127.76(C-4',C-4"), 127.98(C-2',C-2",C-6',C-6''), 128.51(C-3',C-3",C-5',C-5"), 141.94(C-1',C-1"), 211.23(C-4). |
| 2 | **IR:** 3326.24 $cm^{-1}$(N-H), 1621.38 $cm^{-1}$ (C=N) ,1586.35cm-$^1$(C=C Stretching ), 1487.52 $cm^{-1}$(C-C Stretching), 1142.10 $cm^{-1}$, 1088.89 $cm^{-1}$,1010.36 $cm^{-1}$, 823.17 $cm^{-1}$(=C-H Ar 1,4- disubstituted OOP), 537.62 $cm^{-1}$(C-Cl Stretching).<br>**MS**: 788, 726(3.89%), 695(1.29%), 646(7.79%), 644 (14.28%), 587(19.48%), 560(5.19%), 536(9.09%), 494(6.49%), 452(7.79%), 424(12.98%), 389(11.68%), 356(14.28%), 319(23.37%), 293(100%), 277(32.46%), 239(19.48%), 187(3.89%), 162(14.28%).<br>**Anal. Calc. for** $C_{46}H_{38}Cl_4N_4$**:** C,70.06, H,4.86, N,7.10, Found: C,69.04, H,4.78, N,6.97.<br>**$^1$H-NMR:**1.76, 1.51(m,8H,4$CH_2$), 1.91(S,2H,2NH), 3.9(t,4H,4CH), 7.48, 7.44(m,16H,16CH(Ar,piperidin), 7.54(d,4H,4CH,Ar benzidine ), 7.65 (d,4H,4CH Ar benzidine ).<br>**$^{13}$C-NMR:** 31.9(2C,2C-3), 37.9(2C,2C-4), 65.4(4C,2C-2,2C-5), 187.9(2C,2C-4), 140.8(4C,2C-1',2C-1''), 128.2(8C,2C-6',2C-6'',2C-2',2C-2''), 128.6(8C,2C-3',2C-3'',2C-5',2C-5''), 132.6(4C,4C-4'), 122.8, 129.2, 139.3, 149.5(12C,10C-Ar benzidine). |
| 3 | **IR**: 3308.29 $cm^{-1}$ (N-H), 2977.82 $cm^{-1}$ ($CH_2$ asymmetric), 2885.27$cm^{-1}$ ($CH_3$ vibration), 2825.80$cm^{-1}$ ($CH_2$ symmetric) 2792.30cm-$^1$ ($CH_2$ stretching), 1702.57$cm^{-1}$ (C=O), 1455.40$cm^{-1}$ |

| | |
|---|---|
| | ($CH_2$scissoring), 1332.38 $cm^{-1}$ ($CH_2$ wagging), 1275.27$cm^{-1}$ (C-H bending), 1143.03$cm^{-1}$ (bending N-H,OOP), 758.96 $cm^{-1}$, 697.65 $cm^{-1}$ (C-HAr bending out of plane), 670.42 $cm^{-1}$ (C-(C=O)-C Planar bending).<br>**MS**: m/e: 279(P,25.45%), 222(10.30%), 194(88.4%),133(45.4%), 146(26.06%), 165(7.87%), 118(100%), 106(39.39%), 91(44.24%), 77(24.84%), 65(13.93%), 51(16.6%), 39(15.75%).<br>**$^1$H-NMR**($CDCl_3$,400MHZ): $\delta_H$/ppm:0.84(d,6H,2$CH_3$,$^3$J=6.56Hz), 2.19 (s,1H,NH) ,2.82(m,2H,CN-C<u>H</u>-$CH_3$,$^3J_{H2H3}$:7.57Hz,$^3J_{H2HCH3}$; 6.821Hz), 3.63(d,2H,NH-C<u>H</u>-Ar,$^3J_{H2H3}$:7.95Hz), 7.32-7.48 (m,10H,Ar,,$^2$J:6.56Hz).<br>**$^{13}$C-NMR:** ($CDCl_3$,400MHZ): δ/PPm:10.53(2$CH_3$), 52(C-3,C-5), 68.90(C-2,C-6), 127.76(C-4',C-4''), 127.98(C-2',C-2'',C-6',C-6''), 128.51(C-3',C-3'',C-5',C-5''), 141.94(C-1',C-1''), 211.23(C-4). |
| 4 | **IR:** 3374.69$Cm^{-1}$(NH), 3290.69$Cm^{-1}$(NH), 3178$Cm^{-1}$, 3061.75$Cm^{-1}$(C-H Aromatic (stretch out of plane), 1613.56 $Cm^{-1}$ (C=C Stretch), 1582.49$Cm^{-1}$, 1298.97 $Cm^{-1}$(C-N), 744.28 $Cm^{-1}$(C=C Bend aromatic 1,2-Disubstituted).<br>**MS:** 386, 383, 349, 333, 305, 288, 261, 219,186,163,128, 102, 75.<br>**$^1$H-NMR(DMSO)**: 0.69ppm(d,6H,2$CH_3$),$^2J_{(CH3)(CH3)}$=6.82Hz, 2.50(s,DMSO), 2.82(m,2H(3.5), CH-$CH_3$,$^3J_{(H(3)(CH3))}$ =2.90Hz, $^3J_{(H(3,6),H(2,6))}$=6.18Hz) 3.33(NH,S,1H(1), 3.58 (d,2H(2,6),2<u>CH</u>-NH), 5.45(s,NH,1H), 6.43(t,CH,H(10) Ar,$^3J_{H10H9}$=6.94Hz), 6.74(d,CH,H(12)$^3J_{H11H12}$=6.821Hz), 7.01(d,CH,H(9) $^3J_{(H9H10)}$=9.22Hz, 7.09ppm[t,CH,H(11)),$^3J_{(H11H12)}$=6.94Hz,$^3J_{(H11H10)}$=6.94Hz], 7.26PPm(t,CH,2H(4',4''), $^3J_{(H4'H3')}$=6.947Hz, 7.33[t,CH(Ar), 4H(3',3'',5',5'') ,$^3$J=6.94Hz], 7.46ppm[(d,CH(Ar),4H(2',2'', 6',6''),$^3$J=5.81Hz].<br>**$^{13}$C-NMR(DMSO):** 11.16(2CH3,2C), 39.37-40.62(DMSO), 51.28(2C,C-3,C-5), 68.62(2C,C-2,C-6), 87.58(C-4), 115.26(C-12), 116.52(C-9), 116.93(C-10), 127.92(C-2',C-2'',C-6',C-6''), 128.21(C-3',C-3'',C-5',C-5''), 128.68(C-4',C-4''), 131.60(C-11), 135.83(C-8), 142.89(2C,C-1',C-1''), 150.21(1C,C-13).<br>**Anal. Calc. for** $C_{25}H_{26}N_2S$; C:(77.68%), H:(6.78%), N:(7.25%), S:(8.30%)**,** Found: C:(74.32%), H:(4.60%), N:(9.88%), S:(11.2%). |
| 5 | **IR:** 3023.96$Cm^{-1}$(NH), 2919.55$Cm^{-1}$(C-H Alkanes stretch), 1603.09$Cm^{-1}$, 1513.14$Cm^{-1}$, 1443.52$Cm^{-1}$, 813.71$Cm^{-1}$ (C-H Ar oop).<br>**MS**: 369(1.02%), 362(62.16%), 361(52.05%), 349(6.75%), 331(5.40%), 321(100%), 320(10.81%), 305(4.05%), 289(5.40%), 281(8.10%), 280(33.78%), 259, 249, 245, 226, 218, 206, 186, 166.<br>**$^1$H-NMR(DMSO):** 1.79ppm(d,2$CH_3$,6H), 2.10ppm(S,DMSO), 2.50ppm (m,2H(3,5),<u>CH</u>-$CH_3$), 3.03ppm(S,NH,1H(1)), 3.35ppm(d,2H(2,6), 2<u>CH</u>-NH), 4.47ppm(s,2NH, 2H(7,14)), 7.29(2H,CH(9.12)), 7.33ppm(2CH(H10,H11) 6CH(6H), H3',H3'',H5',H5'',$^3$J=5.81Hz), 7.49ppm(H2',H2'', H6',H6') $^3$J=6.69Hz).<br>**$^{13}$C-NMR(DMSO):**11.68(2C,2$CH_3$), 23.02(2C,C-3,C-5), 36.51(2C,C-2,C-9), 86.94(C-4), 108(C-9,C-10, C-11, C-12), 123.92, 126.66, 129.5, 135.49(C-2',C-2'',C-3',C-3'',C-4',C-4'',C-5',C-5''), 142.89(C-1',C-1''), 152.78(C-8,C-13).<br>**Anal. Calc. for** $C_{25}H_{27}N_3$; C: 81.26; H: 7.37; N: 11.37.<br>Found; C:80.24, H:6.96, N:12.58. |

*3.2. Biological Activity*

Table 3 showed that compounds 3',5'-dimethyl-2',6'-diphenyl-3H-spiro[benzo[d]thiazole-2,4'-piperidine](4) and N,N'-bis(2,6-bis(4-chlorophenyl) piperidin-4-ylidene)-[1,1'-biphenyl]-4,4'-diamine(2) was the most potent compound, exhibited very good activity against the five organisms (*Staphylococcus aureus, Escherichia coli, Enterobacter, Salmonella* and *Klebsiella*) compound 3',5'-dimethyl-2',6'-diphenyl-3H-spiro [benzothiazole-2,4'-piperidine] (5) exhibited very good activity against (*Staphylococcus aures, Klebsiella* and *E.coli*) and didn't show any activity against (*Salmonella* and *Enterobacter*).

**Table3:** Effect of synthesized compounds on bacteria

| compounds | Compound 2 (ppm) | | | Compound 4 (ppm) | | | Compound 5 (ppm) | | |
|---|---|---|---|---|---|---|---|---|---|
| Organisms | 250 | 500 | 1000 | 250 | 500 | 1000 | 250 | 500 | 1000 |
| Staphylococcus | 20 | 20 | 20 | 20 | 25 | 25 | 16 | 16 | 19 |
| Klebsiella | 16 | 16 | 19 | 19 | 20 | 25 | 16 | 16 | 19 |
| E.coli | 16 | 16 | 20 | 16 | 16 | 20 | 16 | 19 | 25 |
| Salmonella | 16 | 19 | 20 | 19 | 20 | 25 | - | - | - |
| Enterobacter | - | 20 | 19 | 20 | 25 | 25 | - | - | - |

Zone of inhibition in millimeters

*3.3. Anti-Corrosion Activity*

*3.3.1. XRD analysis*

The 2θ values for Fe 2θ=$45^0$,$65^0$,$82^0$ could be observed in brightly polished mild steel specimens (Figure 3a). The XRD pattern of surface of the mild steel immersed in corrosive environment shows the peaks at 2θ= $14^0$, $17^0$ and $26^0$ apart from the iron peaks (Figure 3b) due to the oxides of iron. The XRD Pattern from the surface of the specimens immersed in 1 $mol.l^{-1}$ $H_2SO_4$ +$1.69\times10^{-3}$ $mol.L^{-1}$ (Figures 3C, 3D and 3E) shows the characteristic iron peaks only. The absence of 2θ values corresponding to iron oxides revealed the surface protecting ability of compound C, D and E.

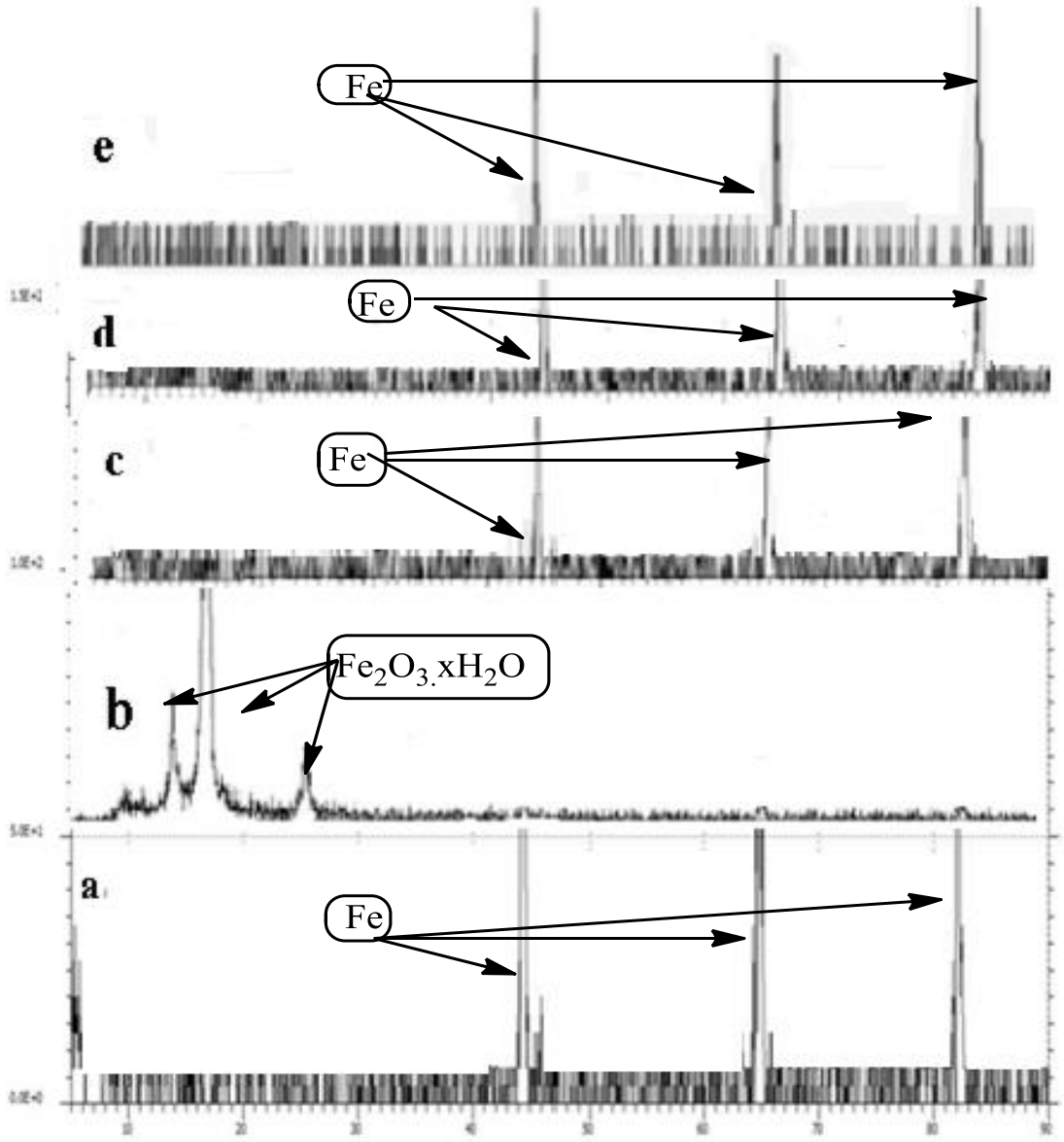


**Figure 3:** XRD Patterns for mild steel specimen in polished condition (a), 1 mol.L $^{-1}H_2SO_4$(b), 1mol.L$^{-1}$ $H_2SO_4$+ 1.69×10-3 mol.L$^{-1}$ 2(c) 1 mol.L$^{-1}H_2SO_4$+ 1.69×10-3 mol.L$^{-1}$ 4(d) ), 1mol.L $^{-1}H_2SO_4$+ 1.69×10$^{-3}$ mol.L$^{-1}$5(e).

*3.3.2. Polarization measurements*

Table 4 shows the corrosion Potential (Ecorr), corrosion current (I corr) and Tafel slopes (ba and bc) values of mild steel in 1mol.L $^{-1}H_2SO_4$ Solution in the absence and presence of inhibitor of all the four compounds at 303K calculated from Figure 4.

**Table 4:** Corrosion kinetic parameters of mild steel exposed to 1 mol.L$^{-1}$ $H_2SO_4$solution in absence and presence of inhibitors

| Compound Name | Rp | bc/(mv.dec -1) | ba /(mv.dec -1) | icorr/ $\mu A.cm^{1-}$ | -Ecorr/mv | IE(Using icorr) % |
|---|---|---|---|---|---|---|
| Blank | - | 12.43 | 6.38 | 480 | 480 | - |
| 2 | 349.83 | 11.82 | 8.18 | 60 | 520 | 86.5 |
| 3 | 440 | 250 | 8.46 | 21.94 | 88.37 | 47.916 |
| 4 | 440 | 60 | 7.79 | 13.72 | 359.39 | 87.50 |

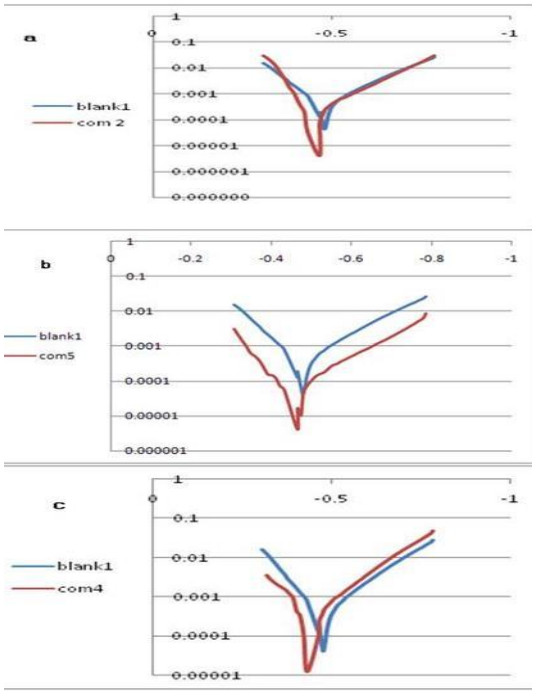


**Figure 4:** Tafel plots obtained for mild steel corrosion in absence and presence of (a) compound 2, (b) compound 4 and (c) compound 5.

## CONCLUSION

Schiff base containing piperidone were synthesized. Compounds 1,3 were prepared, starting with substituted benzaldhyde, Pentanone-3,acetone ketone, and ammonium acetate, via the Mannich reaction. Compound 2 were synthesized via condensation of compound 1 with (benzidine). Compound 4,5 were synthesized by reaction of compound 3 with o-phenylenediamine and o–aminobenzenethiol.

The prepared compounds showed promising antibacterial activity against Gram-positive bacteria *S.aureus* and Gram negative bacteria *Klebsiella, E.coli, Salmonella, Enterobacter.* From the results it is obvious that all the three studied compound function as effective corrosion inhibitors in $1mol.L^{-1}$ $H_2SO_4$ medium with compound (5) being the best of the three then compound (2), and compound (3).

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