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Synthesis, characterization of 4{[(7-chloro-2-nitro phenothiazine-10-yl)-phenyl-methyl]-amino}-benzoic acid derivatives

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ABSTRACT

In this work,we reported the synthesis of Phenothiazine derivatives. Phenothiazine (I) was synthesized by reacting diphenylamine, sulfur, and iodine which subsequently reacted with thionyl chloride and dry benzene is added dropwise to form 2-Chloro 10H- Phenothiazine(II). 2-Chloro 10H- Phenothiazine(II)further reacted with Nitric acid and Con Sulfuric acid by the Nitration Process to form 2-Chloro 7-Nitro10H- Phenothiazine(III).Then2-Chloro 7-Nitro10H-Phenothiazine(III) was reacted with Para-amino benzoic acid with different Aromatic Benzaldehyde under refluxing condition then it form the final product. The yield of novel compound was recorded 46-85%. All compounds were characterized on the basis of Melting point, I.R spectra, N.M.R spectra and MASS spectra.

Key words; Phenothiazine, thionyl chloride, *p*-amino benzoic acid.

INTRODUCTION

The potential use of chlorpromazine derivatives of this phenothiazine as an antimicrobial, increasing activity of antibiotics to which bacteria are susceptible[1-2]and reverse resistance of *Staphylococcus aureus* and corynebacteria to penicillin[3] strongly supports that phenothiazine can be exploited for the management of bacterial infections.

Phenothiazine also called dibenzothiazine or thiodiphenylamine is a yellow or green crystalline compound, which is soluble in hot acetic acid, benzene, and ether. It is obtained by fusing diphenylamine with sulfur. It is a benzo derivative of thiazine although thiazine itself is not used as a starting point in the manufacturing of this molecule. It is a three-ring structure compound in which two benzene rings are joined by a sulfur and nitrogen atom at nonadjacent positions.

The term "phenothiazines" is used to describe the largest of the five main classes of neuroleptic antipsychotic drugs. These drugs have antipsychotic and, often, antiemetic properties, although they may also cause severe side effects such as akathisia, tardive dyskinesia, extrapyramidal symptoms, and the rare but potentially fatal neuroleptic malignant syndrome as well as substantial weight gain. The phenothiazine class of neuroleptic antipsychotic psychotropics are closely related to the thioxanthenes which are very similar pharmacologically.

There are three groups of phenothiazine antipsychotics, differing by their chemical structure and their pharmacological effects. They are the aliphatic compounds, the piperidines and piperazines. An aliphatic compound, piperidine or piperazine branch is added to the phenothiazine molecule for the purpose of enhancing absorption and bioavailability of the phenothiazine chemical[4].

EXPERMENTAL SECTION

Materials

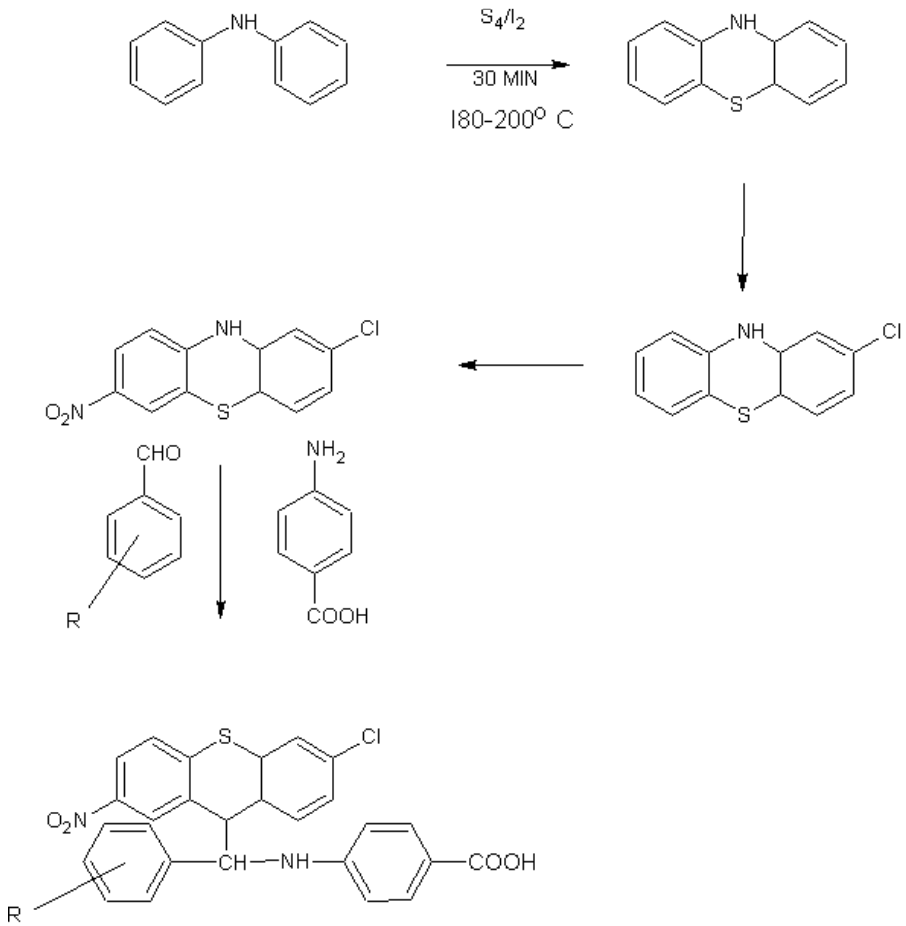
Benzaldehyde, 2–ChloroBenzaldehyde, 4–ChloroBenzaldehyde, 4–Hydroxy Benzaldehyde, 2–Hydroxy Benzaldehyde, 2–Nitro Benzaldehyde, Para-amino benzoic acid, Diphenylamine, 2–Methoxy Benzaldehyde, Pyridine, o-phenylenediamine, Sulfur powder purified, 4–Methoxy Benzaldehyde, 3–Hydroxy Benzaldehyde, 2–Methoxy-4-Hydroxy Benzaldehyde.

Synthesis of 4{[(7-chloro-2-nitro phenothiazine-10-yl)-phenyl-methyl]-amino}-benzoic acid derivatives.

All the melting points were determined in open capillaries and are uncorrected. The purity of the compounds was checked on silica gel plates by using appropriate solvents. The IR spectra (KBr) were recorded on a Shimadzu IR spectrophotometer. ^{1}H- NMR spectra were recorded on Bruker NMR spectrophotometer. (AMX 400 MHz) using $CDCl_3$, DMSO as internal standard. The chemical shift values are expressed in δ ppm (parts per million). The MASS spectrum was recorded on Autospec Mass spectrometer.

General procedure: Then 2-Chloro 7-Nitro10H- Phenothiazine(III) was reacted with Para-amino benzoic acid(0.02mole) with different Aromatic Benzaldehyde In the Presence of Ethanol under refluxing for 4-8 hours then cool the reaction mixture, dried in vaccum dessicator and recrystallised by different solvents. Then final derivative is obtained[5-11].

Scheme



RESULTS AND DISCUSSION

4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-Phenyl-methyl]-amino}-benzoic acid. (IVa)
IR(KBr)- 640, 2974, 1618, 1033, 1136, 3336, 1483, 1002,1734, 920, 975 cm^{-1}: ^{1}HNMR($CDCl_3$)- 7.18 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 6.69 (d, 2H, Phenothiazine), 7.09 (d, 2H ,Phenothiazine), 6.62 (t, 2H, Phenothiazine), 4.25 (s, 1H, Proton of amine group), 5.25 (s, 1H, Proton of methine group), 7.11-7.32(m,5H,Aromatic Benzene) ,6.62-7.22 (m,5H,Aromatic Benzene) 11.08 (s, 1H, Proton of Carboxyllic group); Mass – m\z 503.9

4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-(2-Chloro-Phenyl)-methyl]-amino}-benzoic acid. (IVb)
IR (KBr) - 775, 2976, 1629, 1006, 1236, 3201, 1446,920,1741,879,813,3489 $cm^{-1;}$ ^{1}HNMR($CDCl_3$)- 7.11 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 7.55 (d, 2H, Phenothiazine), 6.62 (d, 2H, Phenothiazine), 7.11 (d, 2H, Phenothiazine), 6.69 (t, 2H, Phenothiazine), 4.25 (s, 1H, Proton of amine group), 5.11 (s, 1H, Proton of methine group), 7.18-7.41(m,5H,Aromatic Benzene) ,6.62-7.23 (m,5H,Aromatic Benzene) 11.30 (s, 1H, Proton of Carboxyllic group).; Mass – m\z 508.12

4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-(4-Chloro-Phenyl)-methyl]-amino}-benzoic acid. (Vc)

IR (KBr)- 648, 2939, 1664, 1037, 1116, 3305, 1494,1037,1801,979,939,2740,1257,1058 cm^{-1} $^1HNMR(CDCl_3)$- 7.18 (d, 2H ,Phenothiazine), 7.57 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 6.69 (d, 2H, Phenothiazine), 7.11 (d, 2H, Phenothiazine), 6.62 (t, 2H, Phenothiazine), 4.15 (s, 1H, Proton of amine group), 5.11 (s, 1H, Proton of methine group), 7.22-7.45(m,5H,Aromatic Benzene) ,6.69-7.31 (m,5H,Aromatic Benzene) 11.30 (s, 1H, Proton of Carboxyllic group); Mass – m\z 538.1

4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-(2-Hydroxy-Phenyl)-methyl]-amino}-benzoic acid. (IVd)

IR(KBr)- 650, 2974, 1512, 1070, 1155, 3387, 1473, 1004,1800,920,977,3445 $cm^{-1;}$ $^1HNMR(CDCl_3)$- 7.13 (d, 2H, Phenothiazine), 7.59 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 6.62 (d, 2H, Phenothiazine), 7.13 (d, 2H, Phenothiazine), 6.62 (t, 2H, Phenothiazine), 4.12 (s, 1H, Proton of amine group), 5.21 (s, 1H, Proton of methine group), 7.09-7.31(m,5H,Aromatic Benzene) ,6.93-7.23 (m,5H,Aromatic Benzene) 11.00 (s, 1H, Proton of Carboxyllic group).; Mass – m\z 519.0

4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-(4-Hydroxy -Phenyl)-methyl]-amino}-benzoic acid. (IVe)

IR (KBr) - 691, 3030, 1629, 1062, 1122, 3338, 1438, 1040, 1746,990,938,2758,1215,1062 cm^{-1} $^1HNMR(CDCl_3)$- 7.09 (d, 2H, Phenothiazine), 7.53 (d, 2H, Phenothiazine), 7.59 (d, 2H, Phenothiazine), 6.93 (d, 2H, Phenothiazine), 7.13 (d, 2H, Phenothiazine), 6.62 (t, 2H, Phenothiazine), 4.12 (s, 1H, Proton of amine group), 5.21 (s, 1H, Proton of methine group), 7.23-7.93(m,5H,Aromatic Benzene) ,6.62-7.31 (m,5H,Aromatic Benzene) 11.00 (s, 1H, Proton of Carboxyllic group).; Mass – m\z 499.0

4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-(2-Nitro -Phenyl)-methyl]-amino}-benzoic acid. (IVf)

IR (KBr)- 572, 2972, 1597, 1024, 1141, 3427, 1355, 1006,1750,918,977 $cm^{-1;}$ $^1HNMR(CDCl_3)$- 7.05 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 6.63 (d, 2H, Phenothiazine), 7.14 (d, 2H ,Phenothiazine), 6.63 (t, 2H, Phenothiazine), 4.24 (s, 1H, Proton of amine group), 5.35 (s, 1H, Proton of methine group), 6.63-7.25(m,5H,Aromatic Benzene) ,7.11-7.99 (m,5H,Aromatic Benzene) 11.13 (s, 1H, Proton of Carboxyllic group); Mass – m\z 548.9

4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-(2-Methoxy -Phenyl)-methyl]-amino}-benzoic acid. (IVg)

IR (KBr)- 734, 3074, 1612, 1018, 1170, 3304, 1490, 1074,1629,933,985 $cm^{-1;}$ $^1HNMR(CDCl_3)$- 7.55 (d, 2H, Phenothiazine), 7.05 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 6.87 (d, 2H, Phenothiazine), 7.14 (d, , 2H, Phenothiazine), 6.82 (t, 2H, Phenothiazine), 4.20 (s, 1H, Proton of amine group), 5.22 (s, 1H, Proton of methine group), 6.82-7.22(m,5H,Aromatic Benzene) ,7.24-7.99 (m,5H,Aromatic Benzene) 10.97 (s, 1H, Proton of Carboxyllic group); Mass – m\z 533.9

4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-(4-Methoxy -Phenyl)-methyl]-amino}-benzoic acid. (Vh)

IR (KBr) - 700, 3024, 1672, 1000, 1185, 1419, 1050, 1691,918,800,3500 $cm^{-1;}$ ^{1}HNMR($CDCl_3$)- 7.10 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 7.45 (d, 2H, Phenothiazine), 6.81 (d, 2H, Phenothiazine), 7.24 (d, 2H, Phenothiazine), 6.87 (t, 2H ,Phenothiazine), 4.11 (s, 1H, Proton of amine group), 5.12 (s, 1H, Proton of methine group), 6.81-6.99(m,5H,Aromatic Benzene) ,7.05-7.78 (m,5H,Aromatic Benzene) 11.11 (s, 1H, Proton of Carboxyllic group).; Mass – m\z 503.9

4{[(7-Chloro-2-nitroPhenothiazine-10-yl)-(3-Hydroxy-Phenyl)-methyl]-amino}-benzoic acid. (Vi)

IR (KBr) - 675, 3026, 1015, 1117, 3026, 1420, 1078, 1600,988,935,2731,1242,1015 $cm^{-1;}$ ^{1}HNMR($CDCl_3$)- 7.10 (d, 2H, Phenothiazine), 7.55 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 6.77 (d, 2H ,Phenothiazine), 7.21 (d, 2H, Phenothiazine), 6.92 (t, 2H, Phenothiazine), 4.01 (s, 1H, Proton of amine group), 5.04 (s, 1H, Proton of methine group), 6.61-7.25(m,5H,Aromatic Benzene) ,7.14-7.97 (m,5H,Aromatic Benzene) 11.11 (s, 1H, Proton of Carboxyllic group); Mass – m\z 519.0

4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-(4-Hydroxy-2-Methoxy-Phenyl)-methyl]-amino}-benzoic acid. (Vj)

IR(KBr)- 770, 2956, 1700, 1050, 1107, 2964, 1456, 1242,1600,950,770 cm^{-1}, ^{1}HNMR($CDCl_3$)- 7.14 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 7.74 (d, 2H, Phenothiazine), 6.98 (d, 2H, Phenothiazine), 7.25 (d, 2H, Phenothiazine), 6.99 (t, 2H, Phenothiazine), 4.18 (s, 1H, Proton of amine group), 5.11 (s, 1H, Proton of methine group), 6.98-7.31(m,5H,Aromatic Benzene) ,7.40-7.98 (m,5H,Aromatic Benzene) 10.99 (s, 1H, Proton of Carboxyllic group); Mass – m\z 509.9

Table-1-5 (IR, N.M.R & MASS of Derivative IVa -IVj)

S.NO.	COMPOUND	IR SPECTRAL DATA	^{1}HNMR($CDCL_3$,DMSO) δ (ppm)	MASS(M\Z)
1.	IVa	640cm^{-1} C-S stretching 2974cm^{-1}C-H Aromatic stretching 1618cm^{-1} Aromatic overtone 1033cm^{-1} C-N Aliphatic stretching 1136cm^{-1} C-N Aromatic stretching 3336cm^{-1} N-H sec. amine stretching 1483cm^{-1} C=O stretching 1002cm^{-1} Aryl benzene 1734cm^{-1} Asymmetric$(N=o)_2$stret 920cm^{-1} Symmetric$(N=o)_2$stret 975cm^{-1} Carboxyllic-O-H out of plane bending	7.18 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 6.69 (d, 2H, Phenothiazine), 7.09 (d, 2H ,Phenothiazine), 6.62 (t, 2H, Phenothiazine), 4.25 (s, 1H, Proton of amine group), 5.25 (s, 1H, Proton of methine group), 7.11-7.32(m,5H,Aromatic Benzene) ,6.62-7.22 (m,5H,Aromatic Benzene) 11.08 (s, 1H, Proton of Carboxyllic group).	**503.96** 502.8, 424.6, 380.2, 344.4, 300.2
2.	IVb	775cm^{-1} C-S stretching 2976cm^{-1}C-H Aromatic stretching 1629cm^{-1} Aromatic overtone 10063cm^{-1} C-N Aliphatic	7.11 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 7.55 (d, 2H, Phenothiazine), 6.62 (d, 2H, Phenothiazine), 7.11 (d, 2H,	**508.12** 508.5, 420.2, 380.2, 350.6, 303.2, 268.4

		stretching 1236cm^{-1} C-N Aromatic stretching 3201cm^{-1} N-H sec. amine stretching 1446cm^{-1} C=O stretching 920cm^{-1} Aryl benzene 1741cm^{-1} Asymmetric(N=o)$_2$stret 879cm^{-1} Symmetric(N=o)$_2$stret 813cm^{-1} Carboxyllic-O-H out of plane bending 3489cm^{-1} -O-H stretching vibration	Phenothiazine), 6.69 (t, 2H, Phenothiazine), 4.25 (s, 1H, Proton of amine group), 5.11 (s, 1H, Proton of methine group), 7.18-7.41(m,5H,Aromatic Benzene) ,6.62-7.23 (m,5H,Aromatic Benzene) 11.30 (s, 1H, Proton of Carboxyllic group). Aromatic Proton)	
3	IVc	648cm^{-1} C-S stretching 2939cm^{-1}C-H Aromatic stretching 1664cm^{-1} Aromatic overtone 1037cm^{-1} C-N Aliphatic stretching 1116cm^{-1} C-N Aromatic stretching 3305cm^{-1} N-H sec. amine stretching 1494cm^{-1} C=O stretching 1037cm^{-1} Aryl benzene 1801cm^{-1} Asymmetric(N=o)$_2$stret 979cm^{-1} Symmetric(N=o)$_2$stret 939cm^{-1} Carboxyllic-O-H out of plane bending 2740cm^{-1} Methyl C-H stret 1257cm^{-1} Asymmetric C-O-C stret 1058cm^{-1} Symmetric C-O-C stret	7.18 (d, 2H Phenothiazine), 7.57 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 6.69 (d, 2H, Phenothiazine), 7.11 (d, 2H, Phenothiazine), 6.62 (t, 2H, Phenothiazine), 4.15 (s, 1H, Proton of amine group), 5.11 (s, 1H, Proton of methine group), 7.22-7.45(m,5H,Aromatic Benzene) ,6.69-7.31 (m,5H,Aromatic Benzene) 11.30 (s, 1H, Proton of Carboxyllic group).	**538.12** 536.2, 460.2, 420.6, 380.6, 340.2, 300.2
4	IVd	650cm^{-1} C-S stretching 2974cm^{-1}C-H Aromatic stretching 1512cm^{-1} Aromatic overtone 1070cm^{-1} C-N Aliphatic stretching 1155cm^{-1} C-N Aromatic stretching 3387cm^{-1} N-H sec. amine stretching 1473cm^{-1} C=O stretching 1004cm^{-1} Aryl benzene 1800cm^{-1} Asymmetric(N=o)$_2$stret 920cm^{-1} Symmetric(N=o)$_2$stret 977cm^{-1} Carboxyllic-O-H out of plane bending 3445cm^{-1} -O-H Ster	7.13 (d, 2H, Phenothiazine), 7.59 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 6.62 (d, 2H, Phenothiazine), 7.13 (d, 2H, Phenothiazine), 6.62 (t, 2H, Phenothiazine), 4.12 (s, 1H, Proton of amine group), 5.21 (s, 1H, Proton of methine group), 7.09-7.31(m,5H,Aromatic Benzene) ,6.93-7.23 (m,5H,Aromatic Benzene) 11.00 (s, 1H, Proton of Carboxyllic group).	**519.02** 520.2, 440.5, 400.6, 360.5, 300.3
5	IVe	691cm^{-1} C-S stretching 3030cm^{-1}C-H Aromatic stretching 1629cm^{-1} Aromatic overtone 1062cm^{-1} C-N Aliphatic stretching 1122cm^{-1} C-N Aromatic stretching 3338cm^{-1} N-H sec. amine	7.09 (d, 2H, Phenothiazine), 7.53 (d, 2H, Phenothiazine), 7.59 (d, 2H, Phenothiazine), 6.93 (d, 2H, Phenothiazine), 7.13 (d, 2H, Phenothiazine), 6.62 (t, 2H, Phenothiazine), 4.12 (s, 1H, Proton of amine group), 5.21 (s, 1H, Proton of methine group),	**548.96** 448.4, 500.5, 420.4, 380.3, 340.4, 300.3,260.4

		stretching 1438cm^{-1} C=O stretching 1040cm^{-1} Aryl benzene 1746cm^{-1} Asymmetric(N=o)$_2$stret 990cm^{-1} Symmetric(N=o)$_2$stret 938cm^{-1} Carboxyllic-O-H out of plane bending 2758cm^{-1} Methyl C-H stret 1215cm^{-1} Asymmetric C-O-C stret 1062cm^{-1} Symmetric C-O-C stret	7.23-7.93(m,5H,Aromatic Benzene) ,6.62-7.31 (m,5H,Aromatic Benzene) 11.00 (s, 1H, Proton of Carboxyllic group).	
6	IVf	572cm^{-1} C-S stretching 2972cm^{-1}C-H Aromatic stretching 1597cm^{-1} Aromatic overtone 1024cm^{-1} C-N Aliphatic stretching 1141cm^{-1} C-N Aromatic stretching 3427cm^{-1} N-H sec. amine stretching 1355cm^{-1} C=O stretching 1006cm^{-1} Aryl benzene 1750cm^{-1} Asymmetric(N=o)$_2$stret 918cm^{-1} Symmetric(N=o)$_2$stret 977cm^{-1} Carboxyllic-O-H out of plane bending	7.05 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 6.63 (d, 2H, Phenothiazine), 7.14 (d, 2H ,Phenothiazine), 6.63 (t, 2H, Phenothiazine), 4.24 (s, 1H, Proton of amine group), 5.35 (s, 1H, Proton of methine group), 6.63-7.25(m,5H,Aromatic Benzene) ,7.11-7.99 (m,5H,Aromatic Benzene) 11.13 (s, 1H, Proton of Carboxyllic group).	**548.96** 448.4, 500.5, 420.4, 380.3, 340.4, 300.3,260.4
7	IVg	734cm^{-1} C-S stretching 3074cm^{-1}C-H Aromatic stretching 1612cm^{-1} Aromatic overtone 1018cm^{-1} C-N Aliphatic stretching 1170cm^{-1} C-N Aromatic stretching 3304cm^{-1} N-H sec. amine stretching 1490cm^{-1} C=O stretching 1074cm^{-1} Aryl benzene 1629cm^{-1} Asymmetric(N=o)$_2$stret 933cm^{-1} Symmetric(N=o)$_2$stret 985cm^{-1} Carboxyllic-O-H out of plane bending	7.55 (d, 2H, Phenothiazine), 7.05 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 6.87 (d, 2H, Phenothiazine), 7.14 (d, , 2H, Phenothiazine), 6.82 (t, 2H, Phenothiazine), 4.20 (s, 1H, Proton of amine group), 5.22 (s, 1H, Proton of methine group), 6.82-7.22(m,5H,Aromatic Benzene) ,7.24-7.99 (m,5H,Aromatic Benzene) 10.97 (s, 1H, Proton of Carboxyllic group).	**533.98** 536.2, 460.2, 420.6, 380.6, 340.2, 300.2
8	IVh	700cm^{-1} C-S stretching 3024cm^{-1}C-H Aromatic stretching 1672cm^{-1} Aromatic overtone 1000cm^{-1} C-N Aliphatic stretching 1185cm^{-1} N-H sec. amine stretching 1419cm^{-1} C=O stretching 1050cm^{-1} Aryl benzene 1691cm^{-1} Asymmetric(N=o)$_2$stret 918cm^{-1} Symmetric(N=o)$_2$stret 800cm^{-1} Carboxyllic-O-H out of plane bending 3500cm^{-1} -O-H stretching vibration	7.10 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 7.45 (d, 2H, Phenothiazine), 6.81 (d, 2H, Phenothiazine), 7.24 (d, 2H, Phenothiazine), 6.87 (t, 2H ,Phenothiazine), 4.11 (s, 1H, Proton of amine group), 5.12 (s, 1H, Proton of methine group), 6.81-6.99(m,5H,Aromatic Benzene) ,7.05-7.78 (m,5H,Aromatic Benzene) 11.11 (s, 1H, Proton of Carboxyllic group).	**503.96** 502.8, 424.6, 380.2, 344.4, 300.2

9	IVi	675cm^{-1} C-S stretching 3026cm^{-1}C-H Aromatic stretching 1600cm^{-1} Aromatic overtone 1015cm^{-1} C-N Aliphatic stretching 1117cm^{-1} C-N Aromatic stretching 3026cm^{-1} N-H sec. amine stretching 1420cm^{-1} C=O stretching 1078cm^{-1} Aryl benzene 1600cm^{-1} Asymmetric(N=o)$_2$stret 988cm^{-1} Symmetric(N=o)$_2$stret 935cm^{-1} Carboxyllic-O-H out of plane bending 2731cm^{-1} Methyl C-H stret 1242cm^{-1} Asymmetric C-O-C stret 1015cm^{-1} Symmetric C-O-C stret	7.10 (d, 2H, Phenothiazine), 7.55 (d, 2H, Phenothiazine), 7.68 (d, 2H, Phenothiazine), 6.77 (d, 2H ,Phenothiazine), 7.21 (d, 2H, Phenothiazine), 6.92 (t, 2H, Phenothiazine), 4.01 (s, 1H, Proton of amine group), 5.04 (s, 1H, Proton of methine group), 6.61-7.25(m,5H,Aromatic Benzene) ,7.14-7.97 (m,5H,Aromatic Benzene) 11.11 (s, 1H, Proton of Carboxyllic group).	**519.02** 520.2, 440.5, 400.6, 360.5, 300.3
10	IVj	770cm^{-1} C-S stretching 2956cm^{-1}C-H Aromatic stretching 1700cm^{-1} Aromatic overtone 1050cm^{-1} C-N Aliphatic stretching 1107cm^{-1} C-N Aromatic stretching 2964cm^{-1} N-H sec. amine stretching 1456cm^{-1} C=O stretching 1242cm^{-1} Aryl benzene 1600cm^{-1} Asymmetric(N=o)$_2$stret 950cm^{-1} Symmetric(N=o)$_2$stret 770cm^{-1} Carboxyllic-O-H out of plane bending	7.14 (d, 2H, Phenothiazine), 7.57 (d, 2H, Phenothiazine), 7.74 (d, 2H, Phenothiazine), 6.98 (d, 2H, Phenothiazine), 7.25 (d, 2H, Phenothiazine), 6.99 (t, 2H, Phenothiazine), 4.18 (s, 1H, Proton of amine group), 5.11 (s, 1H, Proton of methine group), 6.98-7.31(m,5H,Aromatic Benzene) ,7.40-7.98 (m,5H,Aromatic Benzene) 10.99 (s, 1H, Proton of Carboxyllic group).	**509.12** 508.5, 420.2, 380.2, 350.6, 303.2, 268.4

Table-6 Physicochemical Data of 4{[(7-Chloro-2-nitro Phenothiazine-10-yl)-(4-Hydroxy-2-Methoxy-Phenyl)-methyl]-amino}-benzoic acid

Sr. No	Compound	R	M.P (°C)	Yield (%)	Molecular weight	Molecular formula
1.	IVa	H	194-196	82.3	503.96	$C_{26}H_{18}ClN_3O_4S$
2.	IVb	o-Cl	115-117	76.4	538.12	$C_{26}H_{17}Cl_2N_3O_4S$
3.	IVc	p-Cl	161-163	56.3	538.12	$C_{26}H_{17}Cl_2N_3O_4S$
4.	IVd	o-OH	202-204	42.3	519.02	$C_{26}H_{18}ClN_3O_5S$
5.	IVe	p-OH	183-185	73.2	519.02	$C_{26}H_{18}ClN_3O_5S$
6.	IVf	o-NO_2	153-155	85.3	548.96	$C_{26}H_{17}ClN_4O_6S$
7.	IVg	o-OCH_3	258-260	67.3	533.98	$C_{27}H_{20}ClN_3O_5S$
8.	IVh	p-OCH_3	244-246	46.3	533.98	$C_{27}H_{20}ClN_3O_5S$
9.	IVi	o-OH	221-223	58.9	519.02	$C_{26}H_{18}ClN_3O_5S$
10.	IVj	o-OCH_3, p-OH	245-247	77.6	549.98	$C_{27}H_{20}ClN_3O_6S$

CONCLUSION

Compounds IVc, IVf, IVi shows good activity against *E.Coli* (gram negative) *B.subtilis*, *S.aureus*. compound IVb, IVd, IVh shows moderate avtivity against *E.Coli*, *B.subtilis*, *S.aureus* .

The structures of the synthesized compounds were characterized with the help of TLC, IR and NMR, MASS.

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