Synthesis of New Amide and ThioUrease Compounds.

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Abstract:

The reaction of some new Schiff bases (2-[(2-Amino – ethylimino)-methyl]-R , 2-({2-[(R-benzylidene)-amino]-ethylimino}-methyl)-R with Benzoyl chloride or Acetyl chloride were carried out. Subsequent reactions of these products N-(2-Amino-ethyl)-N-[Chloro-(R) –methyl]-benzamide or N-(2-{Ř-[chloro-(R) –methyl]-amino}-ethyl)-N-[chloro-(R) –methyl]- benzamide with thiourea afforded thioureas compounds.

The synthesized compounds were confirmed by their IR,UV,spectra and C.H.N. analysis.

Introduction:

It is known that Schiff bases react smoothly with acid chlorides and anhydrides to give the corresponding addition products[1-5]

Reaction of Schiff base with acid chloride gave imide compounds and reaction of imidecompounds with thiourea afforded thioureas compounds [6]

The synthesis of some new phenobarbital compounds from the reaction of some phenobarbital system containing Schiff bases moiety with benzoyl and 3,5-dinitro benzoyl chlorides .Subsequent reactionsof these products with thiourea afforded thioureas compounds [7] .

Experimental:

Melting points were recorded on Gallenkamp melting points Apparatus and were uncorrected . Elemental analysis was carried out in Mutah University on perkin-Elmre 2400 CHN Elemental analyzer . FT-IR spectra were recorded on FT-IR spectrophotometer -8400s Shimadza (KBr) and UV-Visible spectra were recorded (in ethanol) On Schimadza Reco- 160 Spectrophotometer.

Preparation of Schiff bases (A,B,C,D) :-

Ethylimino and diethylimino were prepared by condensation of ethylene diamine with substituted benzaldehyde . To a solution of o.o5 mole of Ethylene diamine in 30 ml of Ethanol (absolute) was added o.o5 mole or o.1 mole of substituted benzaldehyde and refluxed 2hr. Whereby ayellow crystalline solid separated out . The solid was filtered and recrystallized from ethanol. [8] .

Preparation of N-(2-Amino-ethyl)-N-[Chloro-(R) –methyl]-benzamide or acetamide :-

To an appropriate Schiff base (0.001 mole), Acetyl chloride or benzoyl chlorid (0.015 mole) in dry benzene (25 ml) was added . The mixture was refluxed for (6 hrs), cooled, filtered and recrystallized from absolut ethanol (Tables 1).

Preparation of thioureas compounds:-

To an appropriate derivatives of (1-13) (0.001mole) thiourea (0.002 mole) and Na_2CO_3 (0.002 mole) in absolute ethanol (30ml) were added . The mixture was refluxed for (3 hrs) , cooled and filtered. The filtrate was

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poured into crushed ice, the separated solid was collected and recrystalized from 1,4-dioxan solvent (Tables 2).

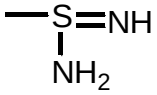
Results and Discussion :-

Schiff bases (A,B,C,D) were prepared by condensation of ethylene diamine with derivatives aldehyde (o-hydroxy benzaldehyde , 4-dimethyl amino benzaldhyde). The reaction was followed by the appearance of absorption bands(1625-1645 cm^{-1}) for (υC=N) at in their IR spectra. In this work the reaction of Schiff-bases compounds with acetyl or benzoyl chlorides and subsequent reactions of above reaction products (1-13) with thiourea were carried out as shown in scheme (1).

However, treatment of Schiff bases with acid halides results in the formation of compounds (1-13) in which two groups (Cl , RC= O) were introduced in the same step of the reaction. This reaction was followed by disappearance of absorption bands at (1235-1250cm^{-1}) and (720-760cm^{-1}) which were attributed to (C-N) and (C-Cl) moieties.

The reaction was involved the attack of the azomethine nitrogen by the carbonyl group of the aroyl chlorides, displacing the chloride as chloride anion and forming the iminium cation.

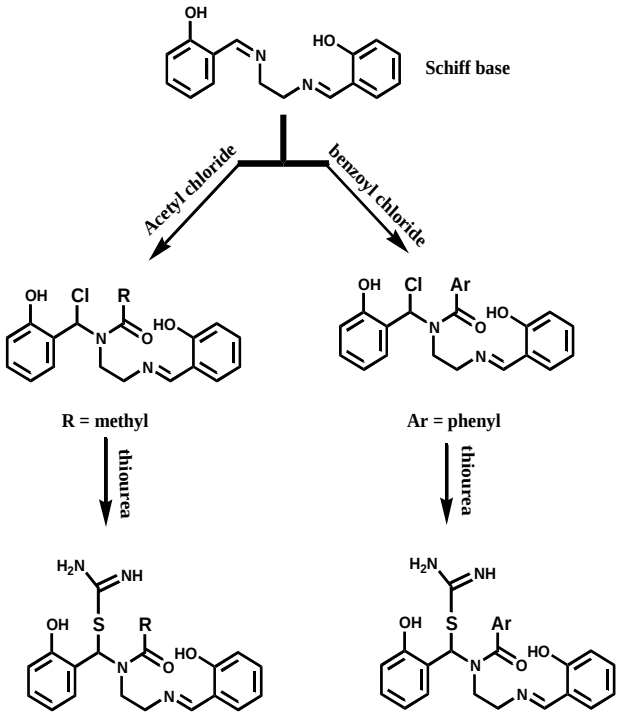
However, iminium cation was unstable, so the Cl – attacked – +N=C moiety and afforded more stable covalently bonded compounds (1-13) Scheme 2).

Moreover, the reactions of acid halides addition products (1-13) with thiourea were afforded thioureas products (14-25). So, heating compounds (1-13) under reflux with thiourea in the presence of Na_2CO_3 for (3hrs) led to the nucleophilic substitution of Cl by  and compounds (14 -25) were formed through the following mechanism (Scheme 3).

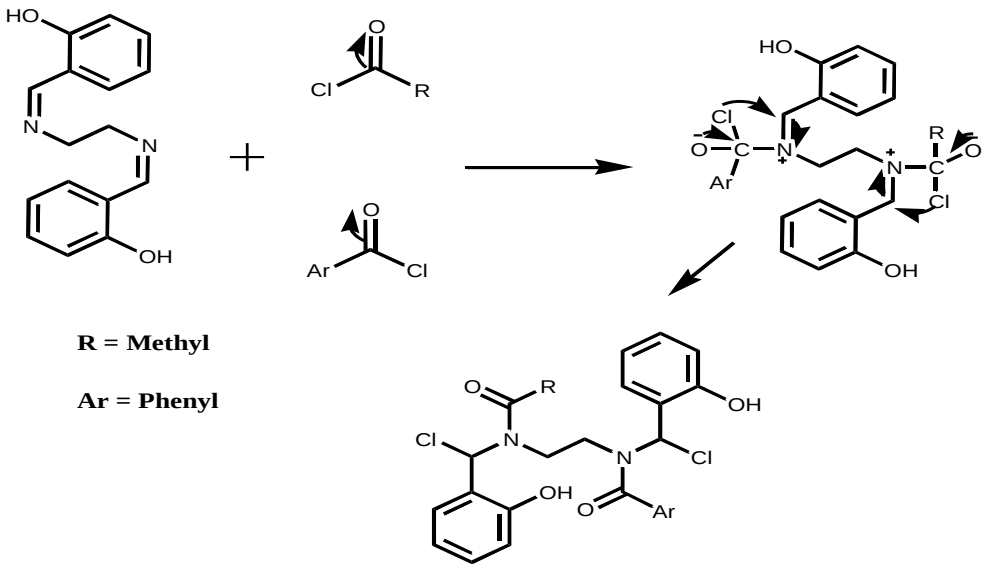
These compounds (14 -25) were characterized by their IR spectra. New doublet absorption bands in the region (3250 – 3450 cm^{-1}) were attributed to (NH_2) and (NH) functional moieties. Other characteristic bands in the region (650-720cm^{-1}) correlated to (υ C-S) moiety. Moreover, (υ C-Cl) around (730-750 cm^{-1}) disappeared.

They reveated strong absorption ranging from (224-235)nm and from (240-290)nm. these absorptions were due π - π* transition or η - electrons of nitrogen atom which was in conjugation with neighbring groups.

The UV-Visibl spectra showed the following maxima (223-238)nm and (300-383)nm, due to the presence of aromatic rings and avariety of substituted grouos .



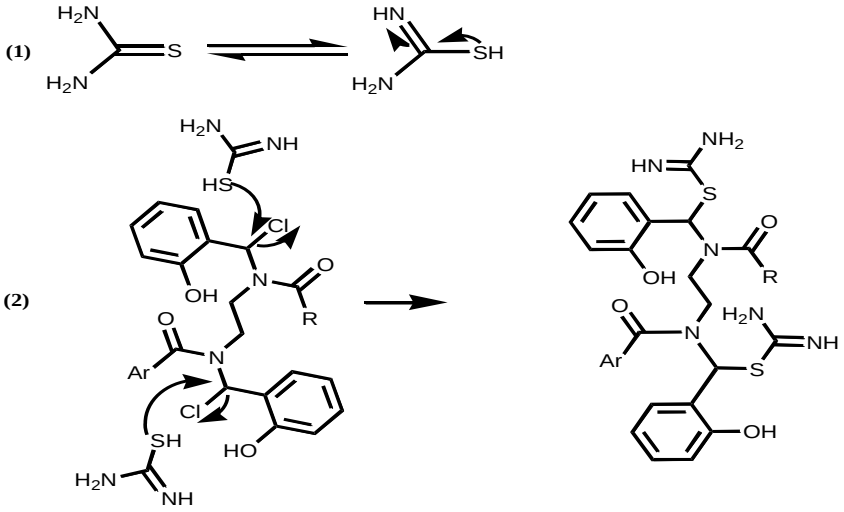
Scheme 1



R = Methyl

Ar = Phenyl

(Scheme 2)



(Scheme 3)

Table(1) : Some physical properties and C.H.N. analyses of compound (1-13).

Comp.	m.p/C°	Yield%	Colour	M.F	Calc.			Found		
					C	H	N	C	H	N
1	200	60	orange	$C_{16}H_{17}ClN_2O_2$	63.05	5.62	9.19	62.95	5.56	9.00
2	179	71	yellow	$C_{18}H_{22}ClN_3O$	65.15	6.68	12.66	65.02	6.58	12.54
3	221	55	orange	$C_{23}H_{21}ClN_2O_3$	67.56	5.18	6.85	67.45	5.04	6.77
4	228	58	yellow	$C_{25}H_{26}ClN_3O_2$	68.88	6.01	9.64	68.75	6.00	9.61
5	211	62	orange	$C_{30}H_{26}Cl_2N_2O_4$	65.58	4.77	5.10	65.44	4.71	5.00
6	230	68	yellow	$C_{32}H_{31}Cl_2N_3O_3$	66.67	5.42	7.29	66.54	5.40	7.15
7	171	52	yellow	$C_{34}H_{36}C_{l2}N_4O_2$	67.66	6.01	9.28	67.58	5.98	9.20
8	160	50	white	$C_{11}H_{15}ClN_2O_2$	54.44	6.23	11.54	54.35	6.19	11.47
9	157	73	orange	$C_{13}H_{20}ClN_3O$	57.88	7.47	15.58	57.78	7.43	15.47
10	181	66	Brown	$C_{20}H_{22}Cl_2N_2O_4$	56.48	5.21	6.59	56.34	5.17	6.45
11	192	60	orange	$C_{25}H_{24}Cl_2N_2O_4$	61.61	4.96	5.75	61.55	4.87	5.68
12	202	53	yellow	$C_{27}H_{29}Cl_2N_3O_3$	63.04	5.68	8.17	62.98	5.52	8.07
13	189	67	white	$C_{29}H_{34}C_{l2}N_4O_2$	64.32	6.33	10.35	64.21	6.23	10.19

Table(2) : Some physical properties and C.H.N. analyses of compound (14-25).

Comp.	m.p/C°	Yield%	Colour	M.F	Calc.			Found		
					C	H	N	C	H	N
14	**149**	**51**	**Light brown**	$C_{17}H_{20}N_4O_2S$	59.28	5.85	16.27	59.20	5.78	16.16
15	**177**	**55**	**Brown**	$C_{19}H_{25}N_5OS$	61.43	6.78	18.85	61.33	6.67	18.75
16	**185**	**46**	**Orange**	$C_{24}H_{24}N_4O_3S$	64.27	5.39	12.49	64.11	5.26	12.40
17	**196**	**49**	**Brown**	$C_{26}H_{29}N_5O_2S$	65.66	6.15	14.73	65.53	6.12	14.66
18	**242**	**62**	**yellow**	$C_{32}H_{32}N_6O_4S_2$	61.13	5.13	13.37	61.05	5.07	13.24
19	**233**	**70**	**yellow**	$C_{36}H_{42}N_8O_2S_2$	63.32	6.20	16.41	63.25	6.12	16.35
20	**162**	**54**	**Orange**	$C_{12}H_{18}N_4O_2S$	51.04	6.43	19.84	50.89	6.32	19.72
21	**140**	**50**	**Brown**	$C_{14}H_{23}N_5OS$	54.34	7.49	22.63	54.27	7.38	22.50
22	**226**	**45**	**Orange**	$C_{22}H_{28}N_6O_4S_2$	52.36	5.59	16.65	52.28	5.48	16.51
23	**211**	**41**	**yellow**	$C_{29}H_{35}N_7O_3S_2$	58.66	5.94	16.51	58.52	6.00	16.49
24	**228**	**52**	**Brown**	$C_{31}H_{40}N_8O_2S_2$	59.97	6.49	18.05	59.88	6.40	17.89
25	**205**	**50**	**yellow**	$C_{31}H_{40}N_8O_2S_2$	57.22	5.34	14.83	57.12	5.23	14.70

Table(3): IR Spectral data of Compounds (1-13).

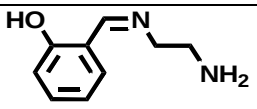
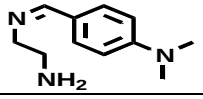
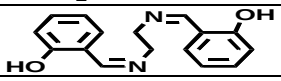
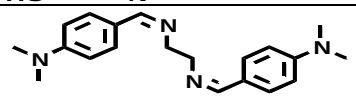
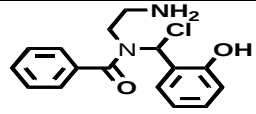
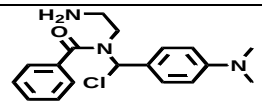
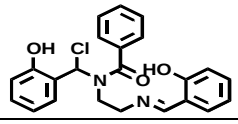
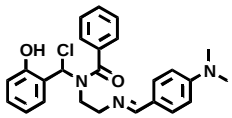
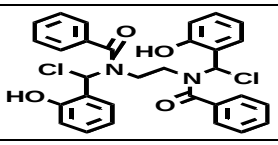
Characteristic bands of IR spactrum									
Com. No.	**υ (O- H) (cm^{-1})**	**υ (C- H)** arom **(cm^{-1})**	**υ (C-H)** aliph. **(cm^{-1})**	**υ (C=O) (cm^{-1})**	**υ (C=C) (cm^{-1})**	**υ (C-O) (cm^{-1})**	**υ (C-N) (cm^{-1})**	**υ (C-Cl (cm^{-1})**	**υ (C=N) (cm^{-1})**
1	3430	3065	2870	1680	1580	1255	1220	750	-
2	-	3070	2850	1690	1570	1270	1225	730	-
3	3450	3090	2880	1685	1570	1290	1230	730	1625
4	-	3080	2890	1680	1595	1260	1240	740	1630
5	3445	3080	2890	1690	1580	1280	1230	740	-
6	3450	3090	2870	1675	1560	1250	1210	740	-
7	-	3070	2875	1690	1555	1265	1230	730	-
8	3440	3080	2900	1680	1570	1270	1240	745	-
9	-	3060	2930	1680	1580	1270	1235	750	-
10	3450	3050	2870	1690	1585	1280	1240	740	-
11	3430	3070	2880	1685	1570	1290	1240	730	-
12	3440	3090	2890	1675	1595	1275	1220	740	-
13	-	3060	2930	1680	1590	1270	1230	750	-

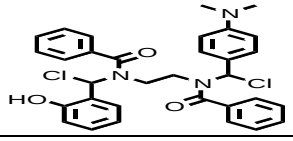
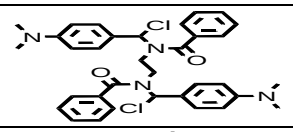
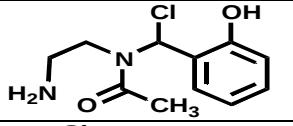
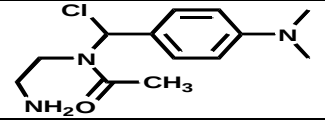
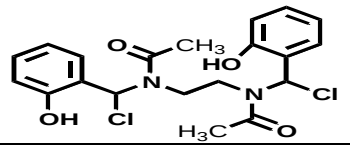
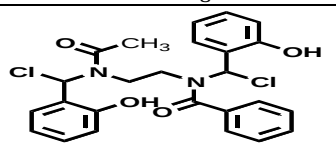
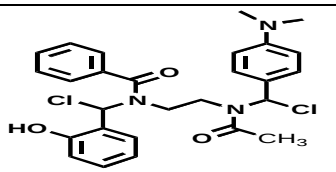
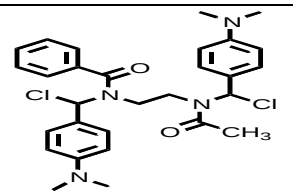
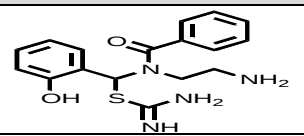
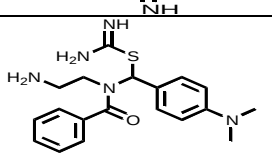
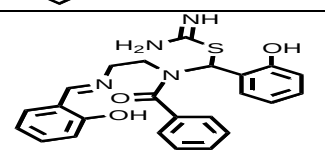
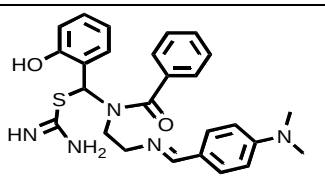
Table(4): IR Spectral data of Compounds (14-25).

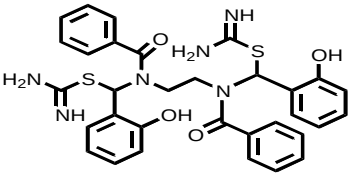
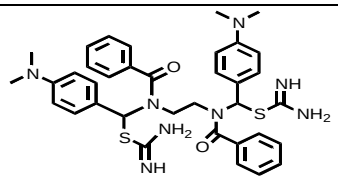
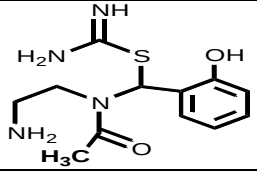
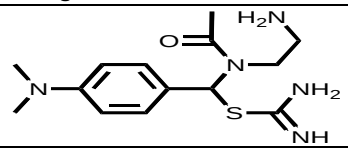
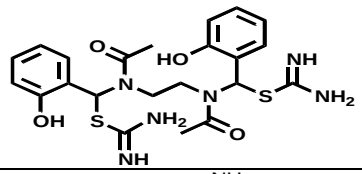
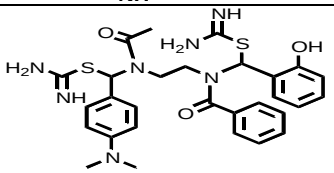
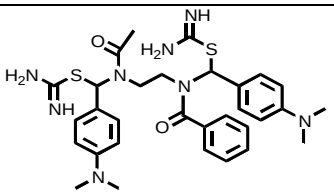
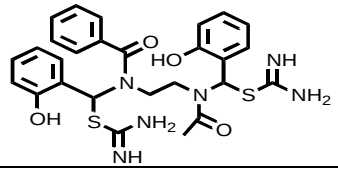
Characteristic bands of IR spactrum									
Comp. No.	**υ (O- H) (cm^{-1})**	**υ (NH) (cm^{-1})**	**υ (C- H)** arom **(cm^{-1})**	**υ (C-H)** aliph. **(cm^{-1})**	**υ (C=O) (cm^{-1})**	**υ (C=N) (cm^{-1})**	**υ (C=C) (cm^{-1})**	**υ (C- S) (cm^{-1})**	**υ (C-N) (cm^{-1})**
14	3440	3200	3060	2870	1680	-	1540	1260	1220
15	-	3230	3080	2890	1670	-	1560	1265	1230
16	3445	3300	3070	2880	1665	1635	1570	1250	1235
17	3440	3260	3050	2890	1670	1630	1590	1280	1230
18	3450	3250	3060	2870	1660	-	1545	1270	1240
19	-	3300	3050	2860	1680	-	1540	1260	1245
20	3450	3240	3070	2895	1685	-	1550	1260	1240
21	-	3230	3090	2880	1670	-	1580	1250	1230
22	3445	3200	3090	2870	1680	-	1560	1260	1220
23	3450	3240	3060	2880	1685	-	1585	1250	1225
24	-	3240	3050	2870	1670	-	1575	1290	1230
25	3450	3200	3080	2860	1670	-	1560	1280	1240

Table(5): UV Spectral data of Compounds (1-25).

Comp.No	UV-Visible absorption maxima λ/nm
1	311,278,269,233,226
2	370,320,266,252,225
3	365,300,260,241,220
4	360,300,261,298,226
5	377,300,269,235,220
6	380,316,272,293,222
7	382,319,265,259,230
8	372,301,265,244,225
9	375,301,275,236,221
10	340,300,255,230,220
11	345,302,266,239,223
12	349,299,256,241,228
13	341,288,251,244,220
14	361,305,249,236,221
15	358,295,246,236,222
16	346,300,250,229,221
17	339,306,252,229,223
18	350,306,260,241,230
19	356,505,285,240,228
20	352,300,271,236,222
21	358,310,277,236,224
22	354,311,274,233,228
23	383,320,266,230,226
24	377,310,255,231,220
25	354,300,251,231,228

No.	Name of compounds	Structure
A	**2-[(2-Amino-ethylimino)-methyl]-phenol**	
B	**4-[(2-amino-ethyliminomethyl]aniline**	
C	**2-({2-[(2-hydroxy-benzylidene)-amino]-ethylimino}-methyl)-phenol**	
D	**N-(4-Dimethylamino-benzylidene)-N'-(4-Dimethylamino-benzylidene)-ethane-1,2-diamine**	
1	**N-(2-Amino-ethyl)-N-[chloro-(2-hydroxy-phenyl)-methyl]-benzamide**	
2	**N-(2-Amino-ethyl)-N-[chloro-(4-dimethylamino-phenyl)-methyl]-benzamide**	
3	**N-[Chloro-(2-hydroxy-phenyl)-methyl]-N-{2-[(2-hydroxy-benzylidene)-amino]-ethyl} -benzamide**	
4	**N-[Chloro-(2-hydroxy-phenyl)-methyl]-N-{2-[(4-dimethylamino-benzylidene)-amino]- ethyl}-benzamide**	
5	**N-(2-{Benzoyl-[chloro-(2-hydroxy-phenyl)-methyl]-amino}-ethyl)-N-[chloro-(2-hydroxy-phenyl)-methyl]-benzamide**	

6	***N*-(2-{Benzoyl-[chloro-(4-dimethylamino-phenyl)-methyl]-amino}-ethyl)-*N*-[chloro-(2-hydroxy-phenyl)-methyl]-benzamide**	
7	**N-(2-{Benzoyl-[chloro-(4-dimethylamino-phenyl)-methyl]-amino}-ethyl)-N-[chloro-(4-dimethylamino-phenyl)-methyl]-benzamide**	
8	**N-(2-Amino-ethyl)-N-[chloro-(2-hydroxy-phenyl)-methyl]-acetamide**	
9	**N-(2-Amino-ethyl)-N-[chloro-(4-dimethylamino-phenyl)-methyl]-acetamide**	
10	***N*-(2-{Acetyl-[chloro-(2-hydroxy-phenyl)-methyl]-amino}-ethyl)-*N*-[chloro-(2-hydroxy-phenyl)-methyl]-acetamide**	
11	***N*-(2-{Acetyl-[chloro-(2-hydroxy-phenyl)-methyl]-amino}-ethyl)-*N*-[chloro-(2-hydroxy-phenyl)-methyl]-benzamide**	
12	***N*-(2-{Acetyl-[chloro-(4-dimethylamino-phenyl)-methyl]-amino}-ethyl)-*N*-[chloro-(2-hydroxy-phenyl)-methyl]-benzamide**	
13	***N*-(2-{Acetyl-[chloro-(4-dimethylamino-phenyl)-methyl]-amino}-ethyl)-*N*-[chloro-(4-dimethylamino-phenyl)-methyl]-benzamide**	
14	**N-(2-Amino-ethyl)-N-[carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-benzamide**	
15	**N-(2-Amino-ethyl)-N-[carbamimidoylsulfanyl -(4-dimethylamino-phenyl)-methyl]-benzamide**	
16	***N*-[Carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-*N*-{2-[(2-hydroxy-benzylidene)-amino]- ethyl}-benzamide**	
17	***N*-[Carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-*N*-{2-[(4-dimethylamino-benzylidene)-amino]-ethyl}-benzamide**	

18	***N*-(2-{Benzoyl-[carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-amino}-ethyl)-*N*-[carbamimidoylsulfanyl-(2-hydroxy-phenyl)- methyl]-benzamide**	
19	***N*-(2-{Benzoyl-[carbamimidoylsulfanyl-(4-dimethylamino-phenyl)-methyl]-amino}-ethyl)-*N*-[carbamimidoylsulfanyl-(4-dimethylamino-phenyl)-methyl]- benzamide**	
20	**N-(2-Amino-ethyl)-N-[carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-acetamide**	
21	**N-(2-Amino-ethyl)-N-[carbamimidoylsulfanyl-(4-dimethylamino-phenyl)-methyl]-acetamide**	
22	***N*-(2-{Acetyl-[carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-amino}-ethyl)-*N*-[carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-acetamide**	
23	***N*-(2-{Acetyl-[carbamimidoylsulfanyl-(4-dimethylamino-phenyl)-methyl]-amino}-ethyl)-*N*-[carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-benzamide**	
24	***N*-(2-{Acetyl-[carbamimidoylsulfanyl-(4-dimethylamino-phenyl)-methyl]-amino}-ethyl)-*N*-[carbamimidoylsulfanyl-(4-dimethylamino-phenyl)-methyl]-benzamide**	
25	***N*-(2-{Acetyl-[carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-amino}-ethyl)-*N*-[carbamimidoylsulfanyl-(2-hydroxy-phenyl)-methyl]-benzamide**	

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تحضير وتشخيص مركبات بعض الاميدات والثايوبوريز الجديدة

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الخلاصة :

تعطي تفاعلات قواعد شيف جديدة (2-[(2-امينو-اثيل امينو)- مثيل] - R، 2-({2-[(R-بنزيلدين)-امينو]-اثيل امينو}-مثيل)-R مع كلوريد البنزويل او كلوريد الاستيل مركبات N-(2-امينو-اثيل)-N-[كلورو- (R) – مثيل]-بنزامايد او N-(2-{ R-[كلورو-(R) –مثيل]-امينو}-اثيل)-N-[كلورو-(R)-مثيل] - بنزامايد. وتفاعلات المركبات الناتجة هذه مع الثايوبوريا يؤدي الى تكوين مركبات الثايوبوريز.
شخصت المركبات المحضرة باستخدام بعض الطرق الطيفية (IR,UV) والتحليل العنصري الدقيق للعناصر.