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Research Article

# Synthesis of Some Thiazole and Phthalazine Compounds from Schiff bases

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## Abstract

It was known that heterocyclic compounds containing S and N have considerable importance which withdraw researchers attention due to their wide medical and biological applications. In the present investigation we have synthesized some ox diazole derivatives (A9-15 ), phthalazine derivatives ( A33-38 ) and Benzo thiazole-2-yl arylthiazol-4-one (A17-24 ), thiazoles (A39-41) from schiff base precursors. The thiazole compounds were cyclized using acetic anhydride, thioglycolic acid while phthalazines were cyclized using amyl alcohol in HCl. The synthesized compounds were studied by IR,1HNMR spectral methods.

**Keywords:** Thiazole; Phthalazine; Schiffbases

## Introduction

Schiff base compounds achieved considerable importance due to their biological and medicinal applications [1]. Some thiazoles have prepared from Schiff bases these compounds showed antibacterial activities [2]. It was found that conversion of some biologically active compounds into Schiff bases will increase their effects for example is nicotinic hydrazone was found more active and safer than the corresponding hydrerazieds [3]. Some Schiff bases prepared from aromatic aldehydes and aromatic amines were found to be used as anti-inflammatory agents during the last decade's [4], and many other medical applications 4,5 while 1,3,4-oxadiazoles for example were extensively studied for the last decades especially in pharmaceutical aspects and other applications [5,6]. Oxadiazoles have been synthesized by numerous methods for example the compound 2-(4-(4-bromophenyl (sulfonylphenyl)-5-flurobenzyl) 1,3,4-oxazole was synthesized from the reaction of 1N–(4-bromophenyl sulfonyl benzyl-4N-(4-fluorophenyl) thio simicarbazide with iodine or KI in ethanol [7]. Chepa and co-workers have synthesized 1,3,4-oxadiazole derivatives [8]. Other researchers [9] have prepared oxazoles from the reaction of amino acid ester hydrazides with benzoyl chloride and cyclized the intermediate with POCl. 1,3,4-Oxadiazoles have also prepared from succinic anhydride and some hydrazides using POCl3 for cyclization [10]. In 2012 Sheet and Mohammed [11] have succeeded in synthesizing 1,3,4-oxadiazoles from oxidation of hydrazones using $PbO_2$. Some thiazole compounds were also found to have medical application [12,13]. There are a lot of methods in the literature for the preparation of thiazole compounds among them, the cyclization of thiosimicarbazides using bromo acetic acid [14]. Tem of researcher have succeeded in synthesizing thiazolidine-4-one from the reaction of hydrazones with thioglycolic acid [14-16]. Phthalazine compounds have also showed many medical application [17,18]. These compounds were prepared by variety of methods among them which is the most common method is the condensation of phthalic ester or anhydride with hydrazine [19]. In 2008 Basheer and Ezzat have synthesized phthalazines by treatment of amino acid hydrazones with saturated solutions of HCl [20].

## Experimental

All melting points were measured by Electro thermal melting point apparatus. All the chemical compounds were supplied by BDh, Aldrichand Fulka. The IR measurements were performed using Infrared spectrophotometer, type Tensor27 Bruker, 1NMR speta were measured (selected compounds in DMSOd6 solvent) using Bruker 400MHz/ Gaziosmanpasa University(Turkey), Compound 1 was prepared according to the published procedure [21].

**Synthesis of (substituted phenyl, substituted benzoyl hydrazonel (A2-8)**

Phenyl hydrazide (0.01 mol.) or 3-Nitrophenyl hydrazide was dissolved in 25 ml of absolute ethanol. Aldehyde or its derivatives was then added. The reaction mixture was refluxed for 2 hours, cooled, stand for 3 hour at r.t. The sp.p.t was filtered off and crystallized from ethanol, Physical and IR spectral data were shown in Tables 1 and 8.

**Table 1:** Physical data for compounds ($A_{2-8}$)

| Comp. No. | X | Y | Molecular Formula | m.p. (ºC) | Yield (%) | Colour |
|---|---|---|---|---|---|---|
| A3 | H | H | $C_{14}H_{12}N_2O$ | 204-207* | 71 | white |
| A3 | 4-Cl | H | $C_{14}H_{11}N_2OCl$ | 164-167* | 80 | white |
| A4 | 2-OH | H | $C_{14}H_{12}N_2O_2$ | 160-163 | 65 | Yellowish white |
| A5 | H | 3-$NO_2$ | $C_{14}H_{11}N_3O_3$ | 206-208 | 88 | white |
| A6 | 4-N($CH_3$)$_2$ | 3-$NO_2$ | $C_{16}H_{16}N_4O_3$ | 218-220 | 93 | red |
| A7 | 2-OH | 3-$NO_2$ | $C_{14}H_11N_3O_4$ | 240-244 | 87 | Yellowish white |
| A8 | 4-Cl | 3-$NO_2$ | $C_{14}H_{10}N_3O_3Cl$ | 147-148 | 91 | yellow |

**Table 8:** IR. Spectral Data For Compounds (A2-8)

| Comp. No. | X | Y | IR υ cm-1 (KBr) | | | Others |
|---|---|---|---|---|---|---|
| | | | C=N, (Ar) | C=O amide | N-H | |
| A2 | H | H | 1600 15311446 | 1642 | 3205 | C=C |
| A3 | 4-Cl | H | 1604 15791488 | 1646 | 3219 | 690 (C-Cl) |
| A4 | 2-OH | H | 1622 16091488 | 1673 | 3271 | 3443 (OH) |
| A5 | H | 3-$NO_2$ | 1618 15731486 | 1664 | 3166 | 1346 sy (NO2) 1536 asy ($NO_2$) |
| A6 | 4-N($CH_3$)$_2$ | 3-$NO_2$ | 1640 16141481 | 1656 | 3238 | 1364 sy (NO2) 1524 asy ($NO_2$) |
| A7 | 2-OH | 3-$NO_2$ | 1612 15751488 | 1650 | 3228 | 1347 sy (NO2) 1525 asy ($NO_2$) |
| A8 | 4-Cl | 3-$NO_2$ | 1622 15921474 | 1672 | 3298 | 751 (C-Cl) 1340 sy ($NO_2$) 1524 asy (NO2) |

**Synthesis of 2,5-diaryl-3-acetyl-1,3,4-oxadiazoles (A9-15)**

Compound (A2-8), (0.003 mol) and 5 ml of acetic anhydride were mixed and refluxed for 2 hours, cooled and 50 gm. Of crushed ice was then added. The mixture was left of r.t for 24 hours. The solid precipitate was filtered and washed with water, dried at r.t. and crystallized from water. The physical properties and IR spectral data shown in Tables (2,9).

**Table 2:** Physical Data For Compounds (A9-15).

| Comp. No. | X | Y | Molecular Formula | m.p. (ºC) | Yield (%) | Colour |
|---|---|---|---|---|---|---|
| A9 | H | H | $C_{16}H_{14}N_2O_2$ | 61-62 | 58 | white |
| A10 | 4-Cl | H | $C_{16}H_{13}N_2O_2Cl$ | 205-208 | 73 | Yellowish white |
| A11 | 2-OH | H | $C_{16}H_{14}N_2O_3$ | 187-190 | 64 | Yellowish white |
| A12 | H | 3-$NO_2$ | $C_{16}H_{13}N_3O_4$ | 100-102 | 77 | Yellowish white |
| A13 | 4-N($CH_3$)$_2$ | 3-$NO_2$ | $C_{18}H_{18}N_4O_4$ | 98-101 | 86 | Yellowish green |
| A14 | 2-OH | 3-$NO_2$ | $C_{16}H_{13}N_3O_5$ | 126-129 | 69 | yellow |
| A15 | 4-Cl | 3-$NO_2$ | $C_{16}H_{12}N_3O_4Cl$ | 95-99 | 72 | yellow |

**Table 9:** IR. Spectral Data For Compounds (A9-15)

| Comp. No. | X | Y | IR υ cm-1 (KBr) | | | | | Other |
|---|---|---|---|---|---|---|---|---|
| | | | N-N | C-O-C | | C=N, | C=O amide | |
| | | | | Sym. | Asym. | (Ar) | | |
| A9 | H | H | 1025 | 1063 | 1216 | 1625 | 1665 | |
| | | | | | | 1,57,91,449 | | |
| A10 | 4-Cl | H | 1011 | 1168 | 1293 | 1624 | 1651 | 813 (C-Cl) |
| | | | | | | 1,59,21,485 | | C=C |
| A11 | 2-OH | H | 1018 | 1063 | 1259 | 1624 | 1664 | 3446 (OH) |
| | | | | | | 1,57,41,489 | | |
| A12 | H | 3-$NO_2$ | 1038 | 1055 | 1217 | 1628 | 1664 | 1348 sy (NO2) 1533 asy ($NO_2$) |
| | | | | | | 1,53,31,487 | | |
| A13 | 4-N($CH_3$)$_2$ | 3-$NO_2$ | 1067 | 1148 | 1287 | 1595 | 1718 | 1173 (C-N) 1346 sy ($NO_2$) 1534 asy ($NO_2$) |
| | | | | | | 1,53,41,439 | | |
| A14 | 2-OH | 3-$NO_2$ | 1012 | 1055 | 1261 | 1634 | 1661 | 1350 sy ($NO_2$) |
| | | | | | | - , 1491 | | 1532 asy ($NO_2$) |
| A15 | 4-Cl | 3-$NO_2$ | 1018 | 1110 | 1221 | 1649 | 1734 | 743 (C-Cl) 1348 sy ($NO_2$) |
| | | | | | | 1,60,71,483 | | 1533 asy ($NO_2$) |

**Synthesis of Arylidenyl 2-benzo-1,3-thiazolyl amine (A16-22)**

2-Amino benzo thiazole (0.01 mol) was dissolved in 20 ml of abs. ethanol, substituted aldehydes (0.01 mol) was then added, 2 drops of glacial acetic acid. The reaction mixture was refluxed for 3 hours after completion of the reaction (TLC), the mixture was cooled, water was then added, the solid product was filtered off and crystallized from ethanol, the physical and spectral data were illustrated in (Tables 3,10).

**Table 3:** Physical Data for Compounds (A16-22)

| Comp. No. | X | Molecular Formula | m.p. (ºC) | Yield (%) | Colour |
|---|---|---|---|---|---|
| A16 | H | $C_{14}H_{10}N_2S$ | 92-94 | 74 | Yellowish white |
| A17 | 4-N($CH_3$)$_2$ | $C_{16}H_{15}N_3S$ | 56-58 | 83 | Deep yellow |
| A18 | 4-$NO_2$ | $C_{14}H_9N_3O_2S$ | 86-90 | 92 | Yellowish white |
| A19 | 4-$OCH_3$ | $C_{15}H_{12}N_2OS$ | 84-86 | 61 | Yellowish green |
| A20 | 4-Cl | $C_{14}H_9N_2SCl$ | 87-88 | 87 | orange |
| A21 | 2-OH | $C_{14}H_{10}N_2OS$ | 99-103 | 80 | Yellowsh white |
| A22 | 2,6-diCl | $C_{14}H_8N_2SCl_2$ | 127-129 | 76 | yellow |

**Table 10:** IR. Spectral Data For Compounds (A16-22)

| Comp. No. | X | IR υ cm-1 (KBr) | | Others |
|---|---|---|---|---|
| | | C=C ,C=C, Ar | C=N | |
| A16 | H | 1,60,61,445 | 1642 | C=C |
| A17 | 4-N($CH_3$)$_2$ | 1,59,61,487 | 1650 | 1165 (C-N) |
| A18 | 4-$NO_2$ | 1,59,61,491 | 1608 | 1351 sy ($NO_2$) 1524 asy ($NO_2$) |
| A19 | 4-$OCH_3$ | 1,56,91,488 | 1601 | 1023 sy (C-O-C) |
| | | | | 1253 asy (C-O-C) |
| A20 | 4-Cl | 1,59,41,446 | 1603 | 729 (C-Cl) |
| A21 | 2-OH | 1,60,01,448 | 1638 | 3398 (OH) |
| A22 | 2,6-diCl | 1,55,31,435 | 1601 | 753,776 (C-Cl) |

**Synthesis of 3-(benzothiazol-2-yl)-2- Arylthiazol -4-one (A17-24)**

A compound of Schiff base A16-22 (0.002 mol) was mixed with (0.002) mol of thioglcolic acid in abs-ethanol (25ml), (0.136 mol) of Zncl2 anhydrous Zncl2 was then added. The reaction mixture was refluxed for 8 hour, cooled, filtered and washed with 3% sodium bicarbonate then with water and crystallized from (Dioxone-water). Physical and spectral data are presented in Tables (4,11).

**Table 4:** Physical Data For Compounds (A17-24).

| Comp. No. | X | Molecular Formula | m.p. (ºC) | Yield (%) | Colour |
|---|---|---|---|---|---|
| A17 | H | $C_{16}H_{12}N_2OS_2$ | dec.188 | 61 | white |
| A19 | 4-N$(CH_3)_2$ | $C_{18}H_{17}N_3OS_2$ | dec.232 | 66 | orange |
| A20 | 4-$NO_2$ | $C_{16}H_{11}N3O3S_2$ | 191-193 | 70 | deepwhite |
| A21 | 4-$OCH_3$ | $C_{17}H_{14}N2O2S_2$ | 163-165 | 52 | white |
| A22 | 4-Cl | $C_{16}H_{11}N2OS_2Cl$ | 178-181 | 64 | Yellowsh white |
| A23 | 2-OH | $C_{16}H_{12}N_2O_2S_2$ | 265-267 | 58 | white |
| A24 | 2,6-diCl | $C_{16}H_{10}N_2OS_2Cl_2$ | 231-233 | 60 | white |

**Table 11:** IR. spectral data for compounds (A18-24)

| Comp. No. | X | IR υ cm-1 (KBr) | | | | Others |
|---|---|---|---|---|---|---|
| | | C-S-C | C-N | C=C, Ar | C=O | |
| A18 | H | 757 | 1219 | 1,57,21,456 | 1665 | C=-=C |
| A19 | 4-N$(CH_3)_2$ | 755 | 1223 | 1,61,31,504 | 1684 | 697 (C-Cl) |
| A20 | 4-$NO_2$ | 762 | 1266 | 1,59,51,456 | 1711 | 1345 sy ($NO_2$) 1519 asy ($NO_2$) |
| A21 | 4-$OCH_3$ | 826 | 1278 | 1,61,21,440 | 1685 | 1032 sy (C-O-C) |
| | | | | | | 1254 asy (C-O-C) |
| A21 | 4-Cl | 758 | 1287 | 1,59,31,446 | 1636 | 731 (Cl) |
| A23 | 2-OH | 754 | 1277 | 1,60,11,445 | 1708 | 3400(OH) |
| A24 | 2,6-Cl | 809 | 1274 | | 1704 | 753,777 (C-Cl) |

**Synthesis of ethyl- N – benzoyl glycinate [22] (A25)**

Dry HCL gas was prepared and passed through (80 ml) of absolute ethanol till saturation. To this solution was added (0.067 mol.) N-benzoyl glycine. The mixture was refluxed at 90°C for 2 hours under dry conditions. After completion of reaction (TLC monitoring). The hot solution was added to 150 ml of water, neutralized with 3% sodium carbonate. The solid product was filtered, dried at r.t and crystallized of 75%, published MP. Is 60.5°C.

**Synthesis of substituted benzaldehyde N- benzoyl glycyl hydrazones (A27-32)**

Equimolar amounts of compound [26] and substituted aldehyde (0.005 mol.) were dissolved in 20 ml. Of ethanol (abs). The mixture was refluxed for 2 hours, cooled. The solid product was crystallized from ethanol, physical and spectral data are presented in (Tables 5,12).

**Table 5:** Physical Data for Compounds (A27-32).

| Comp. No. | X | Molecular formula | m.p. (ºC) | Yield (%) | Colour |
|---|---|---|---|---|---|
| A27 | H | $C_{16}H_{15}N_3O_2$ | 181-184 | 87 | white |
| A28 | 4-N$(CH_3)_2$ | $C_{18}H_{20}N_4O2$ | 214-216 | 74 | white to yellow |
| A29 | 4-$NO_2$ | $C_{16}H_14N_4O_4$ | 226-227 | 70 | Yellowsh white |
| A30 | 4-Cl | $C_{16}H_{14}N_3O_2Cl$ | 212-214 | 65 | white |
| A31 | 2-Cl | $C_{16}H_{14}N_3O_2Cl$ | 146-150 | 79 | white |
| A32 | 3-$NO_2$ | $C_{16}H_{14}N_4O_4$ | 228-230 | 83 | white |

**Table 12:** IR. Spectral Data For Compounds (A27-32)

| Comp. No. | X | IR υ cm-1 (KBr) | | | | Others |
|---|---|---|---|---|---|---|
| | | C=C, Ar | C=N | C=O | N-H | |
| A27 | H | 1,61,21,489 | 1635 | 1685 | 3308 | C=-=C |
| A28 | 4-N$(CH_3)_2$ | 1,55,81,495 | 1616 | 1676 | 3197 | 1180 (C-N) |
| A29 | 4-$NO_2$ | 1,57,01,487 | 1602 | 1699 | 3362 | 1348 sy ($NO_2$) 1539 asy ($NO_2$) |
| A30 | 4-Cl | 1,60,11,489 | 1635 | 1685 | 3315 | 713 (C-Cl) |
| A31 | 2-Cl | 1,56,61,467 | 1608 | 1685 | 3360 | 704 (C-Cl) |
| A32 | 3-$NO_2$ | 1,57,71,487 | 1603 | 1691 | 3342 | 1348 sy ($NO_2$) 1523 asy ($NO_2$) |

**Synthesis of 1-benzamideo methyl substituted phthalazines (A33-38)**

A compound of (A27-32), 0.001 mol. was dissolved in 10 ml of amyl alcohol saturated with dry HCL gas. The mixture was heated on steam bath for 1.5 hour and then refluxed for one hour. After completion of the reaction (TLC monitored), cooled and washed with 20% NaOH then with water and filtered. The solid product was crystallized from dioxane, physical and IR spectral data are presented in (Tables 6,13).

**Table 6:** Physical Data For Compounds(A33-38).

| Comp. No. | X | Molecular formula | m.p. (ºC) | Yield (%) | Colour |
|---|---|---|---|---|---|
| A33 | H | $C_{16}H_{13}N_3O$ | > 350 | 48 | brown |
| A34 | 4-N$(CH_3)_2$ | $C_{18}H_{18}N_4O$ | dec.337 | 80 | Yellowsh green |
| A35 | 4-$NO_2$ | $C_{16}H_{12}N_4O_3$ | 307-308 | 66 | yellow |
| A36 | 4-Cl | $C_{16}H_{12}N_3OCl$ | > 350 | 60 | white |
| A37 | 2-Cl | $C_{16}H_{12}N_3OCl$ | > 350 | 52 | white |
| A38 | 3-$NO_2$ | $C_{16}H_{12}N_4O_3$ | 193-195 | 71 | Deep yellow |

**Table 13:** IR. Spectral data for compounds (A33-38)

| Comp. No. | X | IR υ cm-1 (KBr) | | | Others |
|---|---|---|---|---|---|
| | | C=N | C=O | N-H | |
| A33 | H | 1614 | 1650 | 3417 | C=-=C |
| A34 | 4-N$(CH_3)_2$ | 1604 | 1621 | 3406 | 1178 (C-N) |
| A35 | 4-$NO_2$ | 1599 | 1599 | 3441 | 1346 sy ($NO_2$) 1519 asy ($NO_2$) |
| A36 | 4-Cl | 1600 | 1626 | 3385 | 815 (C-Cl) |
| A37 | 2-Cl | 1614 | 1635 | 3383 | 873 (C-Cl) |
| A38 | 3-$NO_2$ | 1630 | 1630 | 3437 | 1356 sy ($NO_2$) 1529 asy ($NO_2$) |

**Synthesis of 2-Aryl-3- (N- benzoyl glycyl amido)-3-methyl thiazolidine -4-one (A39-41)**

Equimolar amounts of compound (A33-38) and 2-mercapto propionic acid, 0.001 each were refluxed in 20 ml of absolute ethanol and 0.136 mol of Zncl2 (anhydrous) for 8 hours, cooled and washed with $NaHCO_3$ 3% then with water, filtered and the solid product was crystallized from ethanol, physical and IR spectral data were shown in (Tables 7,14).

**Table 7:** Physical Data For Compounds (A39-41)

| Comp. No. | X | Molecular formula | m.p. (ºC) | Yield (%) | Colour |
|---|---|---|---|---|---|
| A39 | H | $C_{19}H_{19}N_3O_3S$ | dec.327 | 72 | yellow |
| A40 | 4-$NO_2$ | $C_{19}H_{18}N_4O_5S$ | 232-234 | 63 | Yellowish white |
| A41 | 2-Cl | $C_{19}H_{18}N_3O_3SCl$ | dec.352 | 56 | ٰwhite |

**Table 14:** IR. Spectral Data for Compounds (A39-41)

| Comp. No. | X | C-S-C | IR υ cm-1 (KBr) | | | Others |
|---|---|---|---|---|---|---|
| | | | C=O amide | C=O lactam | N-H | |
| A39 | H | 854 | 1683 | 1695 | 3309 | |
| A40 | 4-$NO_2$ | 690 | 1708 | 1734 | 3373 | 1346 sy ($NO_2$) 1510 asy ($NO_2$) |
| A41 | 2-Cl | 752 | 1683 | 1712 | 3358 | 700 (C-Cl) |

## Results and Discussion

According to the previous studies heterocyclic compounds were found to have a wide range of medical and biological application [24-26] and are important for human life. For this reasons we are here to discuss the preparation of new series of heterocyclic compounds derived from Schiff bases.

**Synthesis of (substituted phenyl, substituted benzoyl hydra zones (A2-8)**

The above compounds were synthesized from the condensation of phenyl hydrazine with some substituted benzaldehydes as mentioned in the experimental part. The IR spectra for the synthesized compounds were as follows: 1642-1673 cm-1 for C=O amide, 1600-1640 cm-1 for C=N stretching which sometimes appeared within the aromatic C=C region as shown in (Tables 8) while N-H stretching band appeared within, 3166-3299 $cm^{-1}$.

**Synthesis of 2,5-dianyl-3-Acetyl-1,3,4-oxadiazole (A9-15)**

Similar compounds have shown to have significant biological and pharmaceutical effects. These compounds were prepared by numerous methods as it was mentioned in the experimental part among them is the condensation of Schiff base with acetic anhydride so we prepared these compound using this method. The obtained compounds were characterized by the following IR absorption bands: 1651-1734 cm-1 for C=O and at 1595-1645 $cm^{-1}$ for C=N while C-O-C was appeared at 1055-1168, 1216-1293 $cm^{-1}$ for symmetry and asymmetry. Stretching vibration. The other bands were indicated in (Table 9). The 1H NMR of compound (A9) showed the following signals; 1.918ppm singlet for 3H of O=C-$CH_3$, 2.509ppm. As singlet band related to 1H of O-C-H proton while the aromatic protons 10H appeared at 7.198- 8.479ppm.

**Synthesis of arylidine-2-benzo-1,3-thiadiazolene amine (A16-22)**

The above compounds were prepared by condensation of 2-Amino benzothiazole with some substituted benzaldehydes as it was mentioned in the experimental part. These compounds were characterized by the absorption bands as indicated in (Table 10):1601-1650 $cm^{-1}$ for C=C aromatic in which sometimes appeared within the C=N absorption region.

**Synthesis of 3-(benzothiazo-2-yl)-2-aryl thiazoline-4-one (A17-24)**

These compounds were appeared by the condensation of the Schiff base (A9-15) with thioglycolic acid using anhydrous $Zncl_2$. The synthesized compounds were identified by IR and1 HNMR, IR spectral data revealed the presence of the following absorption bands:1636-1171 $cm^{-1}$ assigned for C=O stretch of the thiazolidone, 754-826 cm-1 related for C-N stretch while C=C of the aromatic absorbed with the range of 1437-1613 cm-1 as shown in (Table 11). The 1NMR spectrum for compound (A20) showed the following resonating signals 27ppm for S-CH singlet, 4.01ppm belongs to 2H of $CH_2$ and doublet signed at 6.87, 6.899 for 2H aromatic while the second signed of the aromatic proton appeared at 7.36, 7.346. Benzothiazole protons were found at 7.4-8.0ppm.

Compound (23) showed resonating signal at 2.5ppm corresponds for 2H of $CH_2$ (cyclic) and the spectrum showed a multiple signal at 7.31-7.43 belongs to 3H of ArH and finally a multiple signal of 5.07-8.02ppm assigned for 4H of benzothiazole.

**Synthesis of Ethyl-n-benzoyl glycinate (A25)**

This compound was prepared by esterification of N-benzoyl glycine, IR spectrum of this compound showed the following absorption bands: 1759 cm-1 for C=O ester, 1641 cm-1 for C=O Amide while C=C Aromatic appeared at 1493-1600 cm-1 together with N-H at 3338 cm-1.

**Synthesis of N-benzoyl glyciyl hydrazides (A26)**

The IR spectrum of the above compound revealed the formation of the hydrazide compound through the absorption of this group C=O at lower value and the presence of N-H band at 3194-3488 cm-1 while the C=C appeared at 1491-1577 cm-1.

**Synthesis of N-benzoyl glycyl hydrazones (A27-32)**

The above compounds were identified by IR studies which showed the following absorption bands; 1602-1635 cm-1 for C=N, 1467-1621 cm-1 for Aromatic C=C, 3197-3362 cm-1 belongs to N-H while the C=O of the corresponding hydrazide appeared at 1676-1699 cm-1 as indicated in (Table 12).

**Synthesis of 1-Benzamido methyl substituted pthalizines (A33-38)**

The series of compounds were appeared from the corresponding hydrazones with amyl alcohol in presence of HCL. IR spectrum of these compounds showed the following absorption bands: 1599-1630 cm-1 for C=N, 1599-1650 cm-1 belongs to the amide C=O while the NH appeared at 3383-3441 cm-1 as shown in (Table 13). The1H NMR spectrum of compound (33) exhapted the following signals8.44 ppm for the diazine protons, 8.32 ppm for 5,8 protons of benzene ring, 8.23 ppm d of d for 6,7 protons of the benzene ring, 7.80-7.84ppm for the phenyl ring protons adjacent to the carbonyl, NH at5.84ppm and 3.23 ppm singlet for the CH2 protons.

**Synthesis of -2-Aryl-3-N-benzoylglyl amindo-5-methyl thiazolidine-4-one (A39-41)**

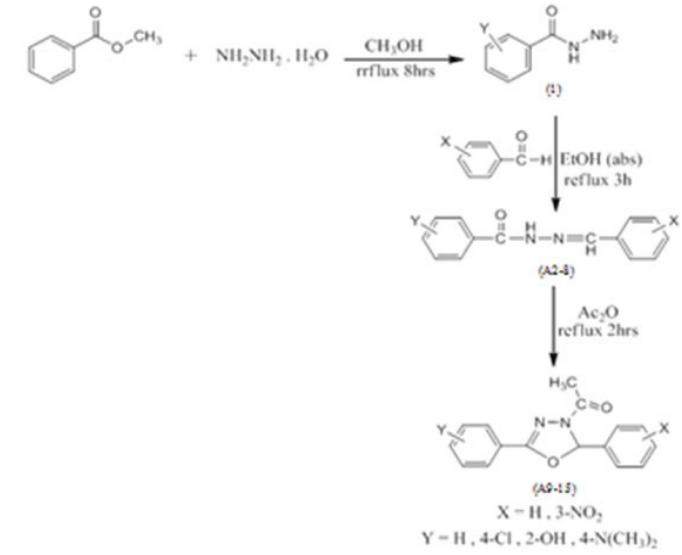
This series of compounds were prepared by the cyclization of the corresponding hydra zones using Zncl2 in absolute ethanol the role of $Zncl_2$ is to catch the OH group of the thio glycolic acid and make the carbonyl of this acid available (more positive) for the nitrogen attack and cyclization. These compounds were identified by IR which showed the following absorption bands; 1695-1734cm-1 belongs to C=O of thiazole ring, C=O Amide at 1683-1708 $cm^{-1}$ while the N-H stretching appeared at 3309-3373 cm-1 as indicated in Table (14).

## Conclusions

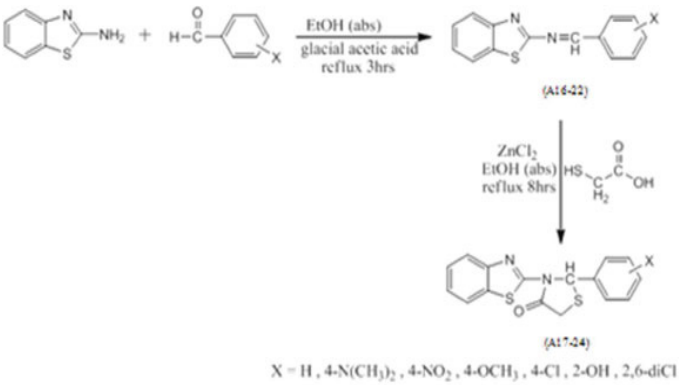
According to the above results it was clear that the intermediate compounds were cyclized into the corresponding thiazoles, thiadiazoles and diazines (Figure 1).

In general, the temporal pattern of gender gap in suicide mortality fluctuations was similar for three countries: sharp decrease in the mid of 1980s, dramatic increase in the 1990s followed by a decline. While the trends in the gender gap have been similar in three countries during the Soviet period, there was significant discrepancy after the collapse of the

Soviet Union in 1991. In particular, in Belarus, the gender gap in suicide rates increased steadily up to 2000, reaching an all-time high, and then started to decrease. The graphical evidence suggests that in all countries, the temporal pattern of alcoholic psychoses incidence rate fits closely with the changes in the gender gap in suicide mortality (Figures 2-4).




**Scheme 1**




**Scheme 2**

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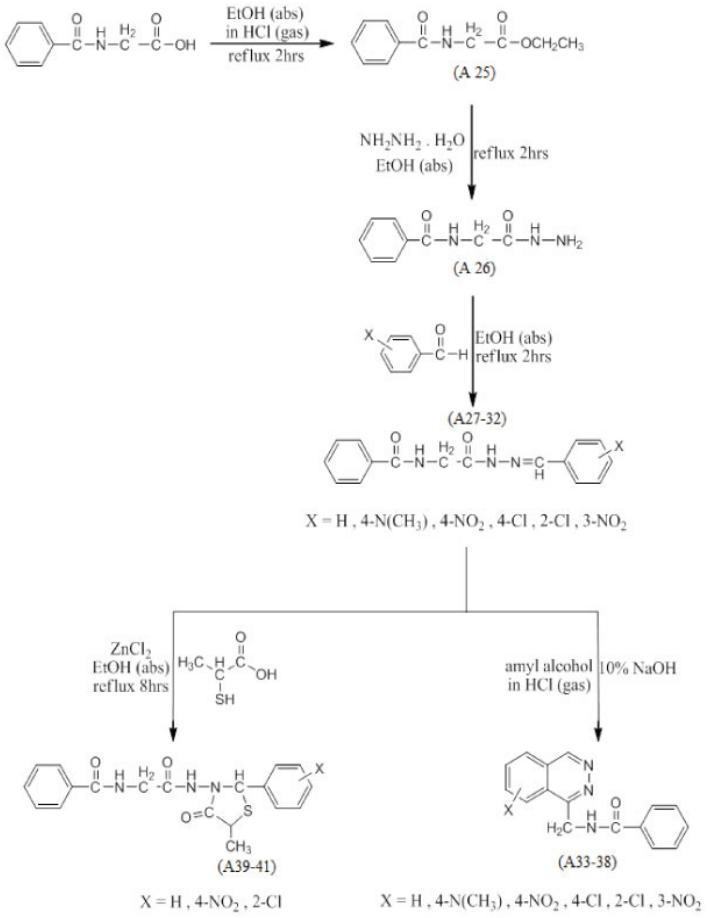


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