Research Article
Volume 16:1, 2025

Chemical Sciences Journal

ISSN: 2150-3494 Open Access

Novel Benzodiazepine Derivatives: Synthesis, Characterization, and Anticonvulsant Activity

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Abstract

New benzodiazepine derivatives namely; N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (1) (13(Z)-4-amino-5-(2-((4-methoxyphenyl)amino)-4-methyl-3H-benzo[b][1,4]diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2) and N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3) have been prepared and characterized by spectroscopic methods (FT-IR, 1H-NMR, UV-visible and EI-mass). Finally, the study of the effect on the anticonvulsant activity of clonazepam derivatives exhibits that derivatives caused a significant decrease in the number of mice with convulsions compared to untreated control groups.

Keywords: Benzodiazepine • Characterization • Anticonvulsant activity

Introduction

Benzodiazepines are a class of drugs that are used to treat anxiety, insomnia, and sleep problems [1]. They have effects such as sedation, hypnosis, muscle relaxation, anticonvulsion, and memory loss [2]. Various methods for measuring benzodiazepines in pharmaceutical and biological samples have been reported [3-12]. Some studies have explored the fluorescence of 1,4-benzodiazepines derivatives and their analytical applications. To produce fluorescent compounds, different approaches were used, such as thermal heating in acidic medium, photochemical degradation, acridine cyclization after hydrolysis to benzophenones, or derivatization with phethaldehyde. Some substances also showed native fluorescence in acidic solution.

The goal of this work is to create novel derivatives, N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4] diazepin-2-amine (1) (13(Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2) and N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4]diazepin-2-amine (3). Furthermore, elemental analysis and traditional spectroscopic techniques were used to characterize them. Finally, the study of the effect on the anticonvulsant activity of these derivatives.

Materials and Methods

Instrumentation and materials

All chemicals and different types of solvents used in the current experiments were extremely pure and purchased from Merck and Sigma-Aldrich. A Perkin–Elmer 2400 series II analyzer instrument was used to determine the percent of elements such as carbon, hydrogen, and nitrogen. BRUKER AVANCE 400 MHz spectrometer was used to identify different types of resonating protons, and ^{1}H NMR spectra were collected. The positions and environment of surroundings protons were identified after comparing them to an internal standard, Tetramethyl Silane (TMS). Electronic spectra were verified on a Unicam UV-Vis spectrophotometer. A Mattson 5000 FTIR spectrophotometer was used to record infrared spectra (4000–400 cm^{-1}) using KBr discs. Mass spectra were performed using DI-50 (Direct Inlet) unit of a Shimadzu mass spectrometer type GC/MS-QP5050A [13].

Synthesis

Preparation of N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4]diazepin-2-amine (1): Benzene-1,2-diamine (1.08 g, 0.01 mol), and N-(4-methoxyphenyl)-3-oxobutanamide (2.07 g, 0.01 mol) were mixed in glacial acetic acid (30 ml) and refluxed for 12 hrs (Figure 1).

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Received: 22 September, 2023, Manuscript No. CSJ-23-114538; **Editor assigned:** 25 September, 2023, PreQC No. CSJ-23-114538 (PQ); **Reviewed:** 09 October, 2023, QC No. CSJ-23-114538; **Revised:** 14 January, 2025, Manuscript No. CSJ-23-114538 (R); **Published:** 21 January, 2025, DOI: 10.37421/2150-3494.2025.16.433

TLC was employed to monitor the reaction's progress. The resulting brown solid was filtered, washed with cold EtOH and dried in vacuum over anhydrous $CaCl_2$.

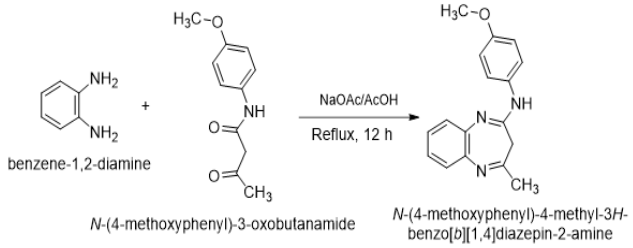

Figure 1. Synthesis of N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4] diazepin-2-amine (1).

N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4]diazepin-2-amine (1): Yield 82%; MP: 90°C, brown solid, FT-IR (KBr cm^{-1}): 3234, 2951, 2835, 1628_{sh}, 1605, 1509, 1138, and 939; ^{1}H-NMR (DMSO-d_6) δ (ppm): 2.69 (s, 3H, CH_3), 3.78 (s, 3H, OCH_3), 3.58 (s, 2H, CH_2), 6.87-7.38 (m, 4H, Ar-H), 7.42-7.83 (m, 4H, Ar-H), 9.52 (s, ^{1}H, NH); Elemental analysis [$C_{17}H_{17}N_3O$]: observed: C; 72.61%, H; 5.9%, N; 15.2%. calculated: C; 73.1%, H; 6.13%, N; 15.04%.

Preparation of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2): N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4]diazepin-2-amine (1) (2.79 g, 0.01 mol), and Thioxo Triazinone (1.58 g, 0.01 mol) were mixed in pyridine (30 ml) and refluxed for 24 hrs (Figure 2). TLC was employed to monitor the reaction's progress. The resulting reddish-brown solid was filtered, washed with cold EtOH and dried in vacuum over anhydrous $CaCl_2$.

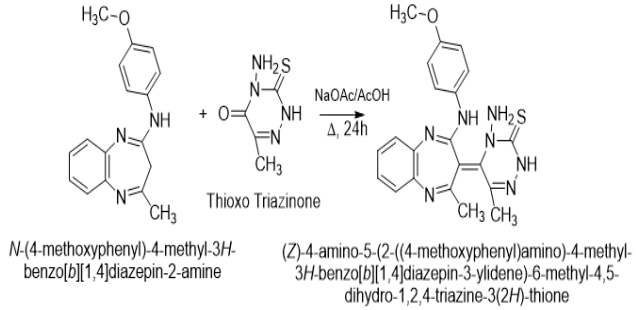

Figure 2. Synthesis of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2).

(Z)-4-amino-5-(2-((4-methoxyphenyl)amino)-4-methyl-3H benzo[b][1,4]diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2): Yield 82%; MP: 115°C, reddish-brown solid, FT-IR (KBr cm^{-1}): 3383, 3272, 3245, 2988, 2879, 2841, 1662, 1631, 1598, 1551, 1260, 1020, 961, and 729; ^{1}H-NMR (DMSO-d_6) δ (ppm): 2.42 (s, 3H, CH_3), 2.73 (s, 3H, CH_3), 3,78 (s, 3H, OCH_3), 5.52 (s, 2H, NH_2), 6.87-7.55 (m, 4H, Ar-H), 7.85-7.90 (m, 4H, Ar-H), 8.46 (s, ^{1}H, NH), 12.94 (s, 1H, NH); Elemental analysis [$C_{21}H_{21}N_7OS$]: observed: C;60.3%, H; 4.97%, N; 23.84%. calculated: C; 60.13%, H; 5.05%, N; 23.37% [14].

Preparation of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3)

N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4] diazepin-2-amine (1) (2.79 g, 0.01 mol), and cyanuric chloride (1.84 g, 0.01 mol) were mixed in pyridine (30 ml) and refluxed for 24 hrs (Figure 3). The refluxed solution was acidified by (glacial acetic acid: water 1:4) then extracted with ethyl acetate and the separated organic layer was evaporated to dryness. TLC was employed to monitor the reaction's progress. The resulting black solid was filtered, washed with cold EtOH and dried in vacuum over anhydrous $CaCl_2$.

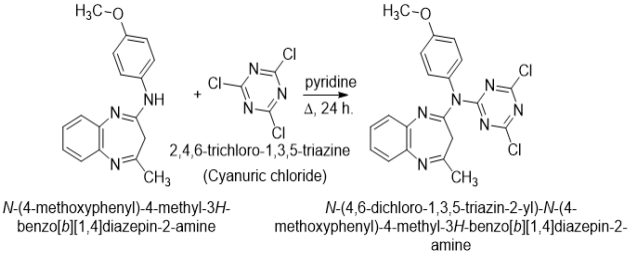

Figure 3. Synthesis of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4] diazepin-2-amine (3).

N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3): Yield 79%; MP: 110°C, black solid, FT-IR (KBr cm^{-1}): 3036, 2882, 1666, 1619, 1544, 1125, and 978; ^{1}H-NMR (DMSO-d_6) δ (ppm): 2.61 (s, 3H, CH_3), 3.79 (s, 3H, OCH_3), 4.51 (s, 2H, CH_2), 6.93-7.31 (m, 4H, Ar-H), 7.85-7.97 (m, 4H, Ar-H); Elemental analysis [$C_{20}H_{16}Cl_2N_6O$]: observed: C; 55.79%, H; 3.48%, N; 19.46%. calculated: C; 56.22%, H; 3.77%, N; 19.67%.

Evaluation of the anticonvulsant activity

Experimental design and treatments: Male Swiss albino mice weighing 20–25 g were divided into four experimental groups of 10 animals each. PTZ (70 mg/kg) was injected intraperitoneally to induce convulsions [15]. The animal groups received treatment 90 min before PTZ as follows:

- Group 1: Untreated control animals injected with PTZ.
- Group 2: Compound (2) (0.1 mg/kg) then PTZ.
- Group 3: Compound (3) (0.1 mg/kg) then PTZ.
- Group 4: Compound (1) (0.1 mg/kg) then PTZ

Animals were then kept under observation for the next 30 min. Loss of righting reflex and latency to convulsions were determined. The latency was estimated at 1800 s in case of absence of seizures.

Results and Discussion

Characterization of compound (1)

Infrared spectrum of compound (1): FT-IR spectrum of N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (1) (Figure 4)

shows bands at 1605, and 1571_{sh} cm^{-1} are assignable to υ(C=C) of both aromatic rings. Furthermore, the bands at 1628_{sh} and 1509 cm^{-1} attributed to stretching of both (C=N) groups of 7-membered ring. while the stretching of NH group was appeared at 3234 cm^{-1}. Also, the bands at 1138 and 939 cm^{-1} are attributed to (CH_2) wagging and υ(C-C) [16], respectively. Finally, the band at 2835 cm^{-1} was attributed to υ(CH_3) while the band of υ(OCH_3) appeared at 2951 cm^{-1}.

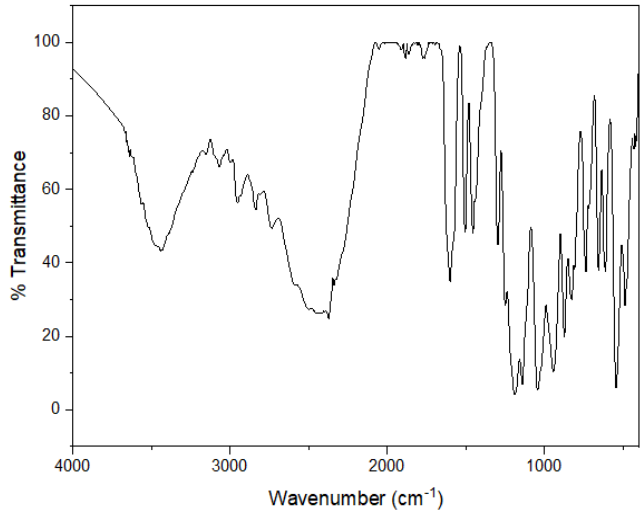

Figure 4. FT-IR spectrum of N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (1).

Electronic spectrum of compound (1): The assignments of significant spectral absorption bands of N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4]diazepin-2-amine (1) are represented in Figure 5. The (1) exhibited band at 230 nm which attributed to π⟶ π* of (C=C) while the band at 265, which may assigned to the n⟶ π* transitions of (C=N) groups.

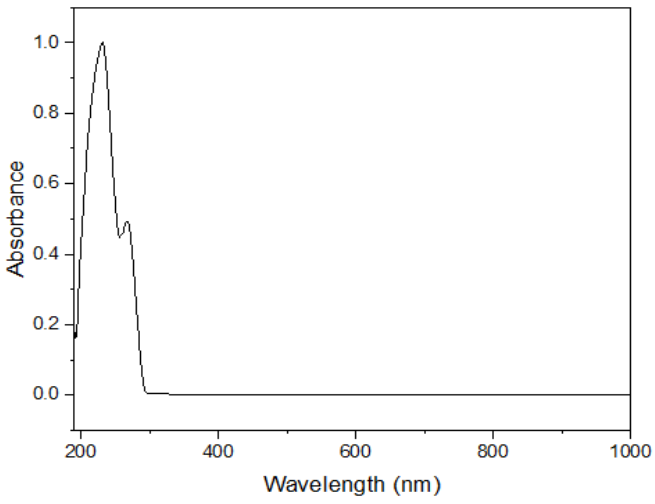

Figure 5. Electronic spectrum of N-(4-methoxyphenyl)-4-methyl-3H-benzo [b][1,4]diazepin-2-amine (1).

^{1}H-NMR spectrum of compound (1): ^{1}H-NMR spectrum of N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (1) (Figure 6) shows the signal at 9.52 ppm (singlet, 1H) which is assignable to (NH) and signal at 3.58 ppm (2H) is assigned to the protons of CH_2. Also, the protons of CH_3 group appeared at 2.69 ppm. Moreover, the signal at 3.78 ppm was attributed to the protons of methoxy group. Furthermore, the region 6.87-7.38 ppm (m, 4H) signals were attributed to aromatic ring protons and region 7.42-7.83 ppm (m, 4H) signals were attributed to the methoxy-aromatic ring protons.

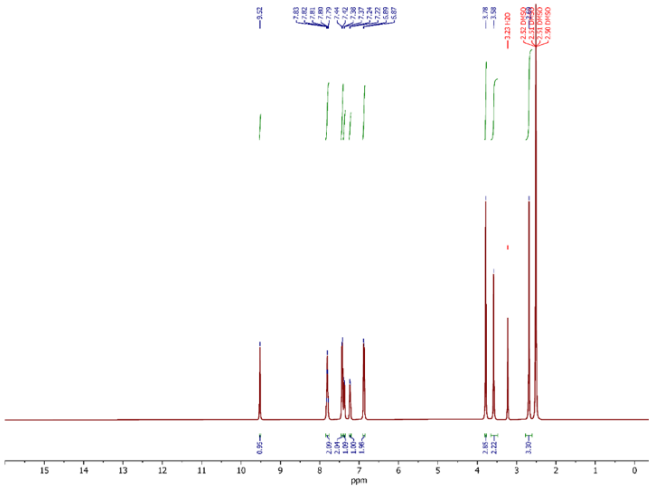

Figure 6. ^{1}H-NMR spectrum of N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (1) in d6-DMSO.

Mass spectrum of compound (1): Mass spectra of prepared compounds (1) (Figure 7) show that its suggested molecular structure as it exhibits molecular ion peaks M^+ at m/z: 279.20 which approves its submitted molecular weight. The fragmentation patterns for the N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4] diazepin-2-amine (1) is given in (Figure 8). Furthermore, the different fragments of (1) give peaks at different m/z values: 91.00 (3.38%), 106.10 (10.26%), 156.10 (100%), and 173.00 (12.17%). These peaks match (C_6H_3O), (C_7H_6O), ($C_{10}H_8N_2$), and ($C_{10}H_{11}N3$) fragments, respectively.

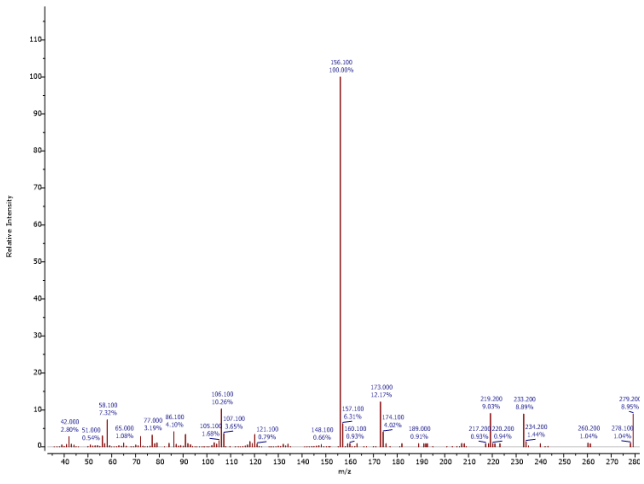

Figure 7. Mass spectrum of N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4]diazepin-2-amine (1).

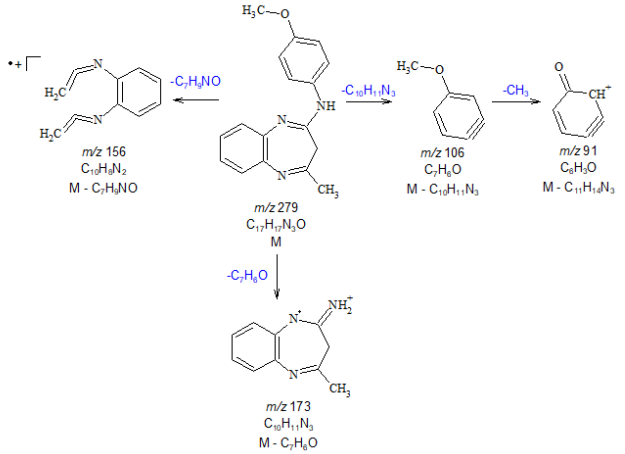

Figure 8. Fragmentation patterns of N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4] diazepin-2-amine (1).

Characterization of compound (2)

Infrared spectrum of compound (2): FT-IR spectrum of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2) (Figure 9) shows the band at 1631 cm^{-1} are attributed to $(C=C)_{Ar}$ of both aromatic rings. While bands at 1260 and 729 cm^{-1} were assigned to υ/δ(C=S) [17]. Furthermore, the bands of both υ(C=N) groups of 7-membered ring was appeared at 1662 and 1598 cm^{-1}, respectively. Moreover, the bands of υ(NH) groups were appeared at 3245, and 3272 cm^{-1}, respectively. While the stretching of NH_2 group was appeared at 3383 cm^{-1}. Furthermore, the band at 1551 cm^{-1} was attributed to υ(C=N). Also, the bands at 2841, and 2879 cm^{-1} were assigned to both $\upsilon(CH_3)$ groups while the band of $\upsilon(OCH_3)$ appeared at 2988 cm^{-1}. Additionally, the band 961 cm^{-1} is attributed to υ(C-C), respectively, beside, the band 1020 cm^{-1} was attributed to υ(N-N).

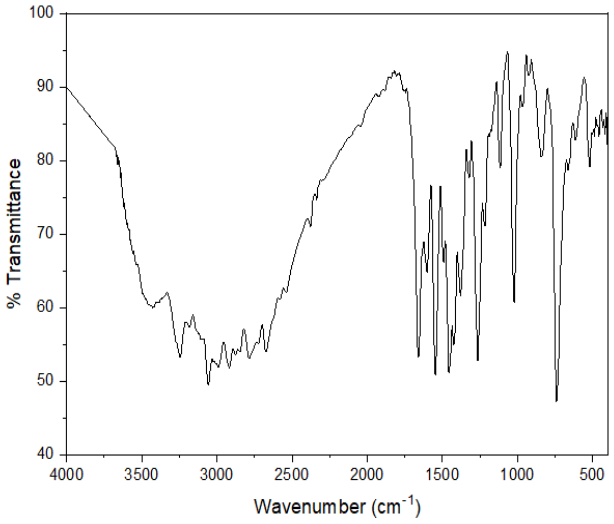

Figure 9. FT-IR spectrum of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2).

Electronic spectrum of compound (2): The assignments of significant spectral absorption bands of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b] [1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2) are represented in Figure 10. The (2) exhibited band at 210 nm which attributed to $\pi \rightarrow \pi^*$ of (C=C) while the bands at 240, and 275 nm, which may assign to the $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ transitions of (C=N) groups, respectively while the band at and 333 is attributed to $n \rightarrow \pi^*$ of (C=S) groups.

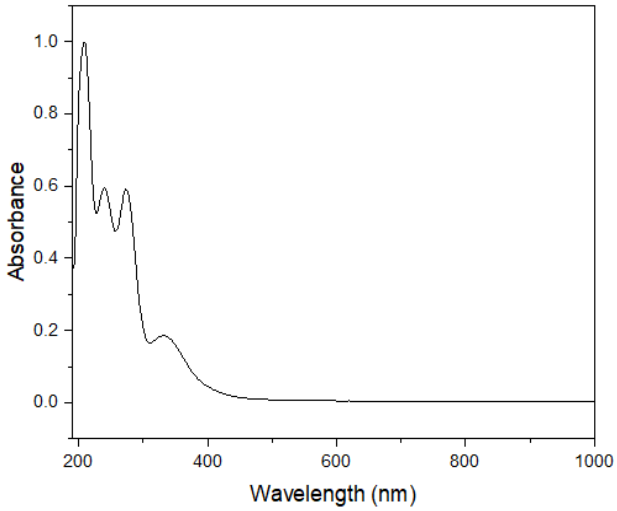

Figure 10. Electronic spectrum of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2).

^{1}H-NMR spectrum of compound (2): 1H-NMR spectrum of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b] [1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2) (Figure 11) exhibits the disappearance of signal of CH2 protons of compound (1) at 3.58 ppm and existence of (NH) proton signal at 8.46 ppm. while the signal of proton of NH group that adjacent to C=S (singlet, 1H) appeared at 12.94 ppm. Moreover, the signal at 5.52 ppm (2H) is attributed to the protons of NH2. Also, the signals at 2.42, and 2.73 ppm are attributed to protons of both CH3 groups. Moreover, the signal at 3.78 ppm was attributed to the protons of methoxy group. Furthermore, the region 6.87-7.55 ppm (m, 4H) signals were attributed to aromatic ring protons and region 7.85-7.90 ppm (m, 4H) signals were attributed to the methoxy-aromatic ring protons [18].

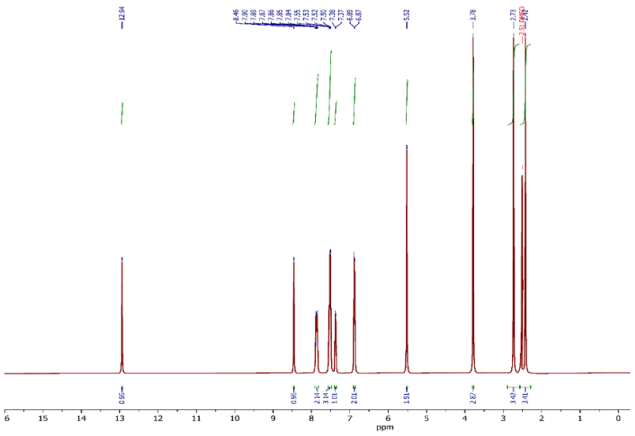

Figure 11. ^{1}H-NMR spectrum of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2) in d6-DMSO.

Mass spectrum of compound (2): Mass spectra of prepared compounds (2) (Figure 12) show that its suggested molecular structure as it exhibits molecular ion peaks M^+ at m/z: 419.30 which approves its submitted molecular weight. The fragmentation patterns for the (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2) is given in (Figure 13). Furthermore, the different fragments of (2) give peaks at different m/z values: 67.00 (24.96%), 79.00 (100%), 91.00 (33.76%), 105.00 (25.00%), 107.10 (27.70%), 271.20 (44.78%), and 296.10 (36.10%). These peaks match (C_4H_3O), (C_5H_3O),(C_6H_3O), (C_7H_5O), (C_7H_7O), ($C_{13}H_{13}N_5S$), and ($C_{14}H_{12}N_6S$) fragments, respectively.

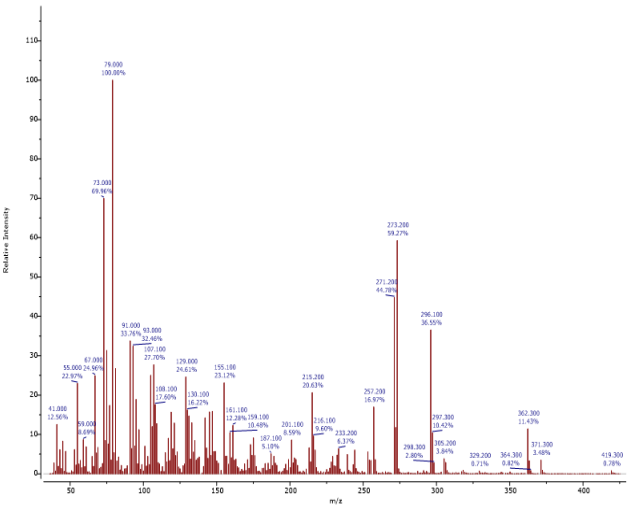

Figure 12. Mass spectrum of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2).

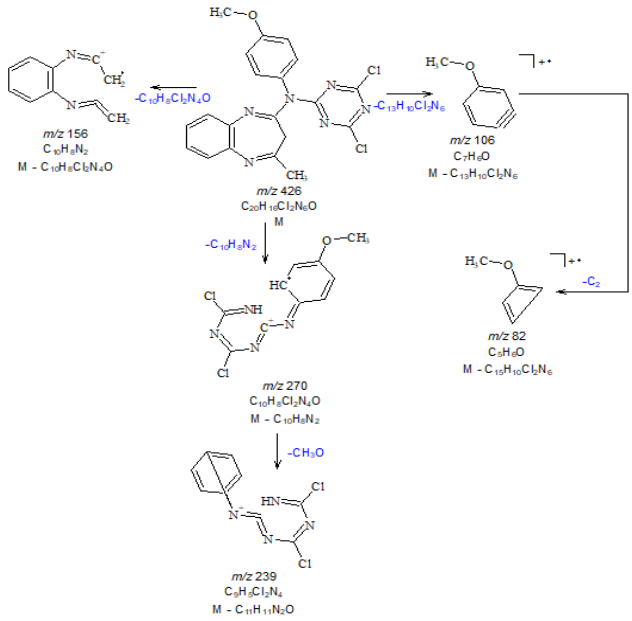

Figure 13. Fragmentation patterns of (Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b][1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2).

Characterization of compound (3)

Infrared spectrum of compound (3): FT-IR spectrum of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4] diazepin-2-amine (3) (Figure 14) shows bands at 1604 cm-1 is attributed to $\upsilon(C=C)_{Ar}$ of both aromatic rings, respectively as well as the band at 1544 cm^{-1} is assigned to $\upsilon(C=N)_{cyanuric}$. Furthermore, the two bands of υ(C=N) groups of 7-membered ring were appeared at 1666 and 1619 cm^{-1}, respectively. While the band of υ(NH) group disappeared. Also, the bands at 1125 and 978 cm^{-1} are attributed to $(CH_2)_{wagging}$ and υ(C-C). Moreover, the band at 2882 cm^{-1} was attributed to $\upsilon(CH_3)$ while the band of $\upsilon(OCH_3)$ appeared at 3036 cm^{-1}.

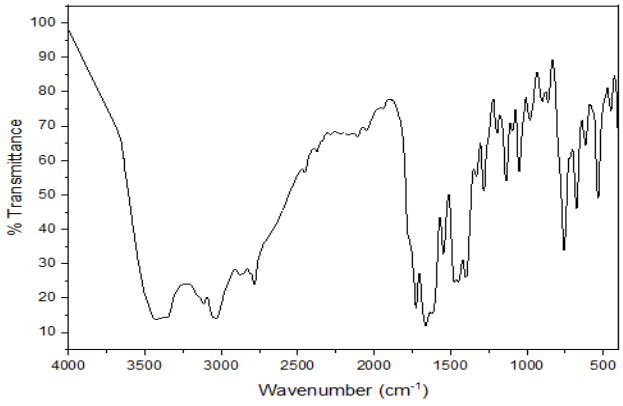

Figure 14. FT-IR spectrum of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3).

Electronic spectrum of compound (3): The assignments of significant spectral absorption bands of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3) are represented in Figure 15. The (3) exhibited band at 219_{sh} nm which attributed to $\pi \rightarrow \pi^*$ of (C=C) while the bands at 241, and 272 nm, which may assign to the $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ transitions of (C=N) groups, respectively.

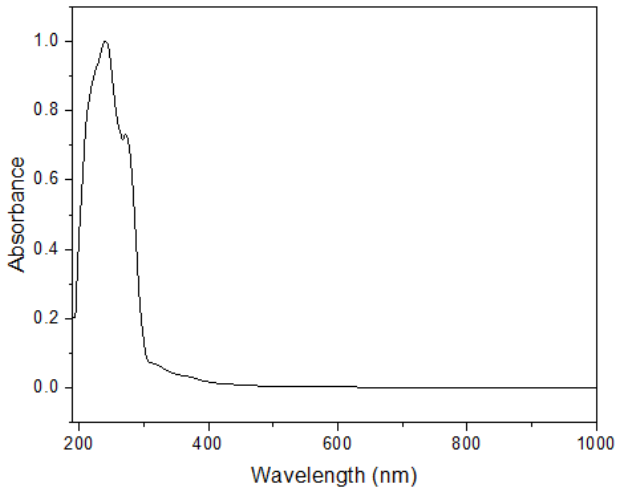

Figure 15. Electronic spectrum of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3).

^{1}H-NMR spectrum of compound (3): 1H-NMR spectrum of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H benzo[b][1,4]diazepin-2-amine (3) (Figure 16) exhibits the disappearance of signal of NH proton of compound (1) at 9.52 ppm. Also, the signal at 4.51 ppm (2H) is assigned to the protons of CH_2. Moreover, the protons of CH_3 group appeared at 2.61 ppm. Moreover, the signal at 3.79 ppm was attributed to the protons of methoxy group. Furthermore, the region 6.93-7.31 ppm (m, 4H) signals were attributed to aromatic ring protons and region 7.85-7.97 ppm (m, 4H) signals were attributed to the methoxy-aromatic ring protons [19,20].

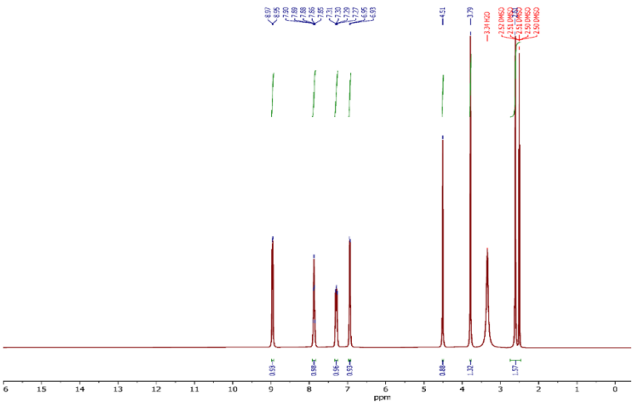

Figure 16. ^{1}H-NMR spectrum of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3) in d6-DMSO.

Mass Spectrum of Compound (3): Mass spectra of prepared compounds (3) (Figure 17) show that its suggested molecular structure as it exhibits molecular ion peaks M^+ at m/z: 426.20 which approves its submitted molecular weight. The fragmentation patterns for the N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H benzo [b][1,4]diazepin-2-amine (3) is given in (Figure 18). Furthermore, the different fragments of (3) give peaks at different m/z values: 82.10 (9.43%), 106.10 (8.42%), 156.10 (100%), 239.10 (2.35%), and 270.00 (3.11%). These peaks match (C_5H_6O), (C_7H_6O), ($C_{10}H_8N_2$), ($C_9H_5Cl_2N_4$), and ($C_{10}H_8Cl_2N_4O$) fragments, respectively.

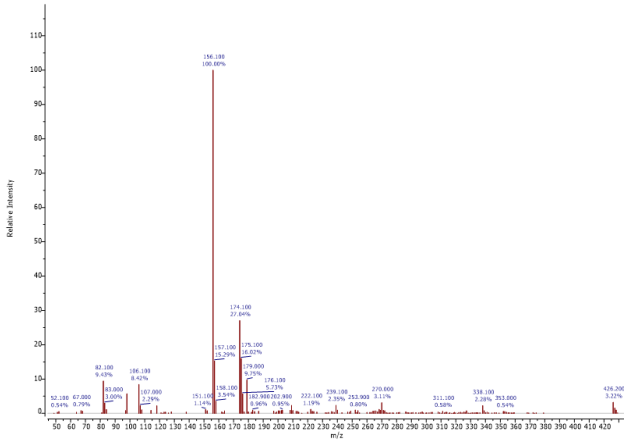

Figure 17. Mass spectrum of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3).

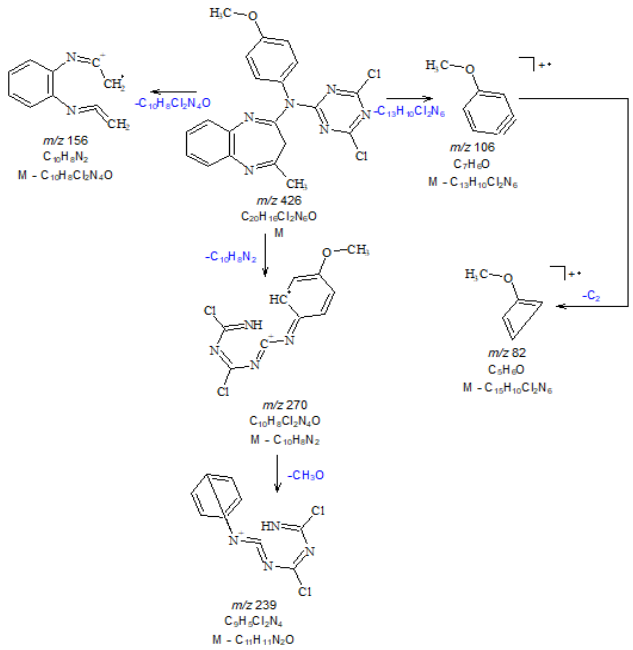

Figure 18. Fragmentation patterns of N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3).

Effect on the anticonvulsant activity of compound (1)

Combination of compound (1) derivatives caused a significant decrease in the number of mice with convulsions compared to untreated control groups. Latency of convulsion and incidence of seizures were decreased in compound (1) derivatives as compared to mice treated with compound (1) (Table 1).

Groups	Number of convulsed/number used	Convulsion latency (Sec)	% incidence of seizures
Control (PTZ)	10/10	168 ± 8	100
Compound (2)	5/10	1690 ± 3	50
Compound (3)	5/10	1720 ± 4	50
Compound (1)	4/10	1640 ± 2	40

Table 1. Effect on the anticonvulsant activity of compound (1) derivatives on Pentylenetetrazole (PTZ).

We tested the impact of compound (1) derivatives as anticonvulsant activity. Interestingly, results indicated that compound (1) derivatives increased the PTZ induced convulsion latency and decreased in the number of convulsed animals. Hence, compound (1) derivatives preserved the anticonvulsant activity higher than the activity of compound (1).

Finally, based on the results, the derivatives of clonazepam, bromazepam and compound (1) may serve as a novel pharmaceutical candidate for epilepsy.

Conclusion

The structure of new clonazepam derivatives namely; N-(4-methoxyphenyl)-4-methyl-3H-benzo[b] [1,4] diazepin-2-amine (1) (13(Z)-4-amino-5-(2-((4-methoxyphenyl) amino)-4-methyl-3H-benzo[b] [1,4] diazepin-3-ylidene)-6-methyl-4,5-dihydro-1,2,4-triazine-3(2H)-thione (2) and N-(4,6-dichloro-1,3,5-triazin-2-yl)-N-(4-methoxyphenyl)-4-methyl-3H-benzo[b][1,4]diazepin-2-amine (3) was confirmed by elemental analysis and spectroscopic methods (FT-IR, ^{1}H-NMR, UV-visible and EI-mass). Moreover, the anticonvulsant activity of these derivatives is investigated and shows a significant reduction in the number of convulsive mice compared to the untreated control groups.

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How to cite this article: Elessawy, Ahmed, Eman A. El-Bastawissy and A.A. El-Barbary. "Novel Benzodiazepine Derivatives: Synthesis, Characterization, and Anticonvulsant Activity." *Chem Sci J* 16 (2025): 433.