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# Synthesis and Biotic Examination of 5-Arylidene- 4-Thiazolidinone Derivatives

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**ABSTRACT: Various substituted 5-arylidene-4-thiazolidinones offshoot were coalescence in superb output by the reaction of Knoevenagel condensation. Skeleton of currently synthesised compounds were set up on the basis of their elementary conclusive test Infra red and 1H NMR spectral reports. The coalescence were examine for their antibacterial action versus Gram +Ve ( S. Aureus and B. Subtilis ) and Gram –Ve (P. aeruginosa and E. coli) microbes.**

**Keywords:** Antimicrobial activity; biotic examination; coalescence; Knoevenagel condensation and thiazol idinones.

**INTRODUCTION:** The therapy of several virulent disorders besides rest a difficulty issue as a result of genesis of multi-medicinal opposing microbes involve one and the other Gram +Ve and Gram -Ve bacteria. Illness originated by these pathogens creates a dangerous question to the scientific commonality and the demand in favour of effective therapy and forming of unique antimicrobial agents. As a consequence, the buildup of new antimicrobial agents is in constant demand. Thiazolidine derivatives are a class of compounds which merit special attention because it harmonizes to a group of substances with activeness in medicinal chemistry. The 5-arylidene derivatives of 4-thiazolidinones are also well known for their versatile pharmacological activities[1-3]. The presence of certain groups such as hydroxy, methoxy, thio and chloro in the phenyl ring has been reported to increase the activity of the parent compounds. The 5-arylidene derivatives are known to possess antibacterial[4-5], anti-inflammatory[6-8], anticancer [9-11], antifungal[12-14], analgesic[15-16], anticonvulsant[17-18], antiviral [19-20], activities. 5-arylidene offshoot of thiazolidin-4-one has been fix to be prominent fungistatic medium than the procreator 4-thiazolidinones[21-23]. Various techniques have been progress for the build-up of 5-arylidene derivatives of 4-thiazolidinones. The better conventional is Knoevenagel condensation midway aromatic aldehydes and 4-thiazolidinones carry through glacial acetic acid included anhydrous sodium acetate[24-28].

**MATERIAL AND METHODS:** Entire solvents and syntheticals used were of commercial or LR grade, and were used without additional ablution. The synthesized compounds are first purified by recrystallisation using appropriate solvents. The melting points (ºC) were recorded by open capillary tubes method and were uncorrected. IR (Infra red) spectra's were read on Shimadzu FTIR using KBr discs. 1H NMR spectral range was point out on Bruker Avance II 400 spectrometer in $CDCl_3$ using TMS as a internal standard reference. Chemical shift is given in δppm.

**General scheme for synthesis of 5-arylidene-4-thiazolidinone derivatives:** The substituted 4-thiazolidinones compound (0.01M) and anhydrous sodium acetate (0.01M) in glacial acetic acid (35 mL), was added the respective aromatic aldehydes (0.01M). The combo was inflame retroflux during 9-10 hours and pass into icy water. The precipitate was filtered and crystallized from acetic acid. Physical and spectral data are listed below.

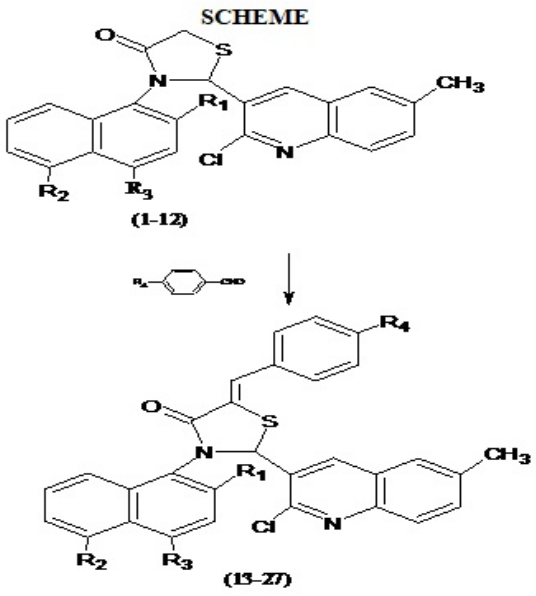

**Table 1: Physical Properties.**

| Comp. No | $R_1$ | $R_2$ | $R_3$ | $R_4$ | Molecular Formula | Comp. No | MP°C | % Yield | R.F. Value | % Nitrogen | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Found | Calculated |
| 13 | H | $SO_3H$ | H | H | $C_{30}H_{21}ClN_2O_4S_2$ | 13 | 178 | 65 | 0.59 | 6.35 | 6.38 |
| 14 | $CH_3$ | H | H | H | $C_{31}H_{23}ClN_2OS$ | 14 | 182 | 61 | 0.52 | 7.49 | 7.51 |
| 15 | H | $NO_2$ | H | H | $C_{30}H_{20}ClN_3O_3S$ | 15 | 199 | 66 | 0.60 | 10.35 | 10.40 |
| 16 | H | H | H | H | $C_{30}H_{21}ClN_2OS$ | 16 | 180 | 66 | 0.53 | 7.78 | 7.81 |
| 17 | H | H | Br | H | $C_{30}H_{20}BrClN_2OS$ | 17 | 205 | 62 | 051 | 5.65 | 5.69 |
| 18 | H | $SO_3H$ | H | $OCH_3$ | $C_{31}H_{23}ClN_2O_5S_2$ | 18 | 230 | 60 | 0.55 | 4.62 | 4.64 |
| 19 | $CH_3$ | H | H | $OCH_3$ | $C_{32}H_{25}ClN_2O_2S$ | 19 | 195 | 62 | 0.51 | 5.19 | 5.21 |
| 20 | H | $NO_2$ | H | $OCH_3$ | $C_{31}H_{22}ClN_3O_4S$ | 20 | 210 | 65 | 0.56 | 7.37 | 7.40 |
| 21 | H | H | H | $OCH_3$ | $C_{31}H_{23}ClN_2O_2S$ | 21 | 185 | 61 | 0.59 | 5.31 | 5.35 |
| 22 | H | H | Br | $OCH_3$ | $C_{31}H_{22}BrClN_2O_2S$ | 22 | 212 | 61 | 053 | 5.31 | 5.36 |
| 23 | H | $SO_3H$ | H | OH | $C_{30}H_{21}ClN_2O_5S_2$ | 23 | 235 | 60 | 0.52 | 5.75 | 5.77 |
| 24 | $CH_3$ | H | H | OH | $C_{31}H_{23}ClN_2O_2S$ | 24 | 221 | 62 | 0.50 | 5.31 | 5.35 |
| 25 | H | $NO_2$ | H | OH | $C_{30}H_{20}ClN_3O_4S$ | 25 | 236 | 65 | 0.54 | 7.54 | 7.58 |
| 26 | H | H | H | OH | $C_{30}H_{21}ClN_2O_2S$ | 26 | 205 | 62 | 0.57 | 5.47 | 5.50 |
| 27 | H | H | Br | OH | $C_{30}H_{20}BrClN_2O_2S$ | 27 | 200 | 62 | 0.50 | 5.52 | 5.51 |

**Table: 2: Antimicrobial Study**

| **Comp. No.** | **Gram negative** | | **Gram positive** | |
|---|---|---|---|---|
| | ***E. coli*** | ***P. aeruginosa*** | ***S. Aureus*** | ***B. subtilis*** |
| 13 | 18 | 17 | 18 | 16 |
| 14 | 14 | 16 | 15 | 14 |
| 15 | 16 | 18 | 17 | 16 |
| 16 | 12 | 15 | 12 | 10 |
| 17 | 7 | 14 | 12 | 10 |
| 18 | 16 | 15 | 17 | 16 |
| 19 | 17 | 16 | 11 | 16 |
| 20 | 18 | 15 | 12 | 15 |
| 21 | 15 | 13 | 10 | 12 |
| 22 | 15 | 13 | 10 | 12 |
| 23 | 18 | 17 | 17 | 16 |
| 24 | 12 | 15 | 15 | 16 |
| 25 | 15 | 17 | 16 | 15 |
| 26 | 09 | 12 | 15 | 13 |
| 27 | 16 | 10 | 14 | 15 |

*Strongly active range 15-18 mm, Moderately active range 11-14mm, Weakly active range 7-10 mm*

**Spectral Analysis of compound no. (19):**

**IR (νmax) (cm-1):** 1271 (C-N Str.), 1710 (C=O Str.), 3036 (=CH Str. in Ar), 1250 (C-OC Str.), 636 (C-S-C Str.).

NMR (δ ppm) : 3.6 ( s, 3H, $OCH_3$), 2.4 ( s, 3H, $CH_3$), 6.31- 7.55 (m, 15H, Ar-H), 5. 82(s, 1H, S-CH-N).

**Antimicrobial Activity:** The antimicrobial activity of synthesized 5-arylidene derivatives of thiazolidin-4-ones compounds was verified systematically against strains of bacteria Gram-negative (Escherichia coli and Pseudomonas aeruginosa) and Gram-positive (Staphylococcus Aureus and Bacillus subtilis). Bacteria exhibit valuable work toward all microbes species (Table 2). By the evidence of screening data it was observed that these heterocyclic compounds can be easily used against treatment of disease caused by test microbes.

**CONCLUSION:** Thus from above result it was observed that all compounds tested against *E.coli, P.aeruginosa, S.aureus, B.subtilis* are effective. So those compounds can be easily be used for the treatment of diseases caused by test pathogens, only when they does not have toxic and other side effects.

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**REFERENCES:**


**1.** Solankee, A. N., Patel, K. P., and Patel, R. B. (2012) Efficient synthesis and pharmacological evaluation of some new 4-thiazolidinones and 5-Arylidenes, *Arch. Appl. Sci. Res.*,4 (1), 72-77.

**2.** Srivastava, S. K., Srivastava, S. L., and Srivastava, S. D. (2001) Synthesis of 5-Arylidene-2-aryl-3-(2-chlorophenothiazinoacetamidyl)-1, 3-thiazolidin -4-ones as antifungal and anticonvulsant Agents, *J. Indian Chem. Soc*., 77, 104.

**3.** Asati, K. C., Srivastava, S. K., and Srivastava, S. D. (2006) Synthesis of 5-Arylidene-2-aryl-3-(benzotriazoloacetamidyl)-1,3-thiazolidin-4-ones as analegesic and antimicrobial agents, *Indian J. Chem.*, 45(B), 526-531.

**4.** Khan, K. M., Ali, M., Farooqui, T. A., Khan, M., Taha, M., and Shahnaz P. (2009) An Improved method for the synthesis of 5-Arylidene barbiturates using $BiCl_3$, *J.Chem. Soc. Pak.*, 31(5), 823-828.

**5.** Saeed, A., Al-Masoudi, N. A., and Pannecouque, C. (2012) In-vitro anti-HIV activity of new thiazol-2-ylidene substituted benzamide analogues, *Der Pharma Chemica*, 4(1), 106-115.

**6.** Waghmare, R. A., Bhosle, M. R., Khillare, L. D., and Mane, R. A. (2015) Synthesis and anti-inflammatory evaluation of new 5-Arylidene-3-methylsulphonyl thiazolidine-2, 4-diones, *wjpps.*, 4(4), 1171-1182.

**7.** Panico, A., Maccari R., Cardile, V., Crascì, L., Ronsisvalle, S., and Ottana, R. (2013) 5-Arylidene-4-Thiazolidinone derivatives active as Antidegenerative Agents on Human Chondrocyte Cultures, *Medicinal Chemistry*, 9(1), 84-90.

**8.** Stana, A., Tiperciuc, B., Duma, M., Pirnau, A., Verite, P., and Oniga, O. (2014) Synthesis and antimicrobial activity of some new N-(aryloxoalkyl)-5-Arylidene-thiazolidine-2,4-diones **,** *J. Serb. Chem. Soc.*, 79 (2) 115–123.

**9.** Abdellatif , K. R. A., Abdelall, E. K. A., Abdelgawad, M. A., Abdelhakeem, M. M., and Omar, H. A. (2015) Design and synthesis of certain novel Arylidene thiazolidinone derivatives as anti-cancer agents, *Der PharmaChemica*, 7(8), 149-161.

**10.** Lobo, P. L., Poojary, B., Manjunatha, K., Prathibha, A., and SuchethaKumari, N. (2012) Novel thiazolidine-2,4-dione mannich bases Synthesis, characterization and antimicrobial activity, *Der PharmaChemica*, 4(3), 867-871.

**11.** Chavan, A. A., and Pai, N. R. (2007) Synthesis and antimicrobial screening of 5-Arylidene-2-imino-4-thiazolidinones, *ARKIVOC*, (16), 148-155.

**12.** Thirupathi, G., Venkatanarayana, M., Dubey, P. K., and Bharathi Kumari, Y. (2012) Facile and green syntheses of substituted-5-Arylidene-2,4-thiazolidinediones using L-tyrosine as an Eco-Friendly catalyst in aqueous medium, *Der PharmaChemica*, 4(5), 2009-2013.

**13.** Kumar, D., Narwal, S., and Sandhu, J. S. (2013) Catalyst-Free Synthesis of Highly Biologically Active 5-Arylidene Rhodanine and 2,4-thiazolidinedione derivatives using aldonitrones in polyethylene glycol, *International Journal of Medicinal Chemistry*, Article ID 273534,4.

**14.** Srivastava, S. K., Yadav, R., and Srivastava, S. D. (2004) Synthesis and biological activity of 4-oxothiazolidines and their 5- Arylidenes, *Indian Journal Of Chemistry*, 43B(2), 399-405.

**15.** Asati, K. C., Srivastava, S. K., and Srivastava, S. D. (2006) Synthesis of 5-Arylidene-2-aryl-3-(benzotriazoloacetamidyl)-1,3-thiazolidin-4-ones as analegesic and antimicrobial agents, *Indian J. Chem.*, 45B, 526-531.

**16.** Mulwad, V. V., Abid, A. M., and Parmar, H. T. (2009) Synthesis and antimicrobial screening of 5-Benzylidine-2-imino-3-(2-oxo-2H- benzopyran-6-yl)-thiazolidin-4-one and its derivatives, *Indian Journal Of Chemistry*, 48B, 137-141.

**17.** Behbehani, H., and Ibrahim, H. M. (2012) Synthesis of novel enaminones, azolopyrimidines and 2-Arylimino-5-Arylidene-4-thiazolidinones, *Molecules*, 17, 6362-6385.

**18.** Garnaik, B. K., and Dash, S. (2015) Synthesis and antibacterial study of inclusion complexes of 2-(benzothiazolyl-2')-azino-5-Arylidene-4-thiazolidinone, *J. Chem. Pharm. Res.*, 7(5), 102-108.

**19.** Mohammadi, A., Ghafoori, H., Rassa, M., and Safarnejad, M. (2015) Aryl azo 5-Arylidene-2,4-thiazolidinone dyes as novel antioxidant and antibacterial compounds, *Prog. Color Colorants Coat.*, 8, 145-152.

**20.** Dhanashire, Shweta T., Singh, P. R.P., and Toraskar, M. P. (2010) Synthesis and antimicrobial evaluation of some 4-substituted Thiazolidinone derivatives, *Der Pharma Chemica*, 2(4), 17-20.

**21.** Khillare, S., Lande, M., Shinde, N., and Arbad, B., Ni – Mg ferrite as a recyclable, magnetically separable heterogeneous catalyst for the synthesis of 5-Arylidene-2,4-thiazolidinediones, *SAJMS*, 3(6), 116-126.

**22.** Metwally, N. H., Rateb, N. M., and Zohdi, H. F. (2011) A simple and green procedure for the synthesis of 5-Arylidene-4-thiazolidinones by grinding, *Green Chemistry Letters and Reviews*, 4(3), 225-228.

**23.** Ottona, R., Maccari, R., Barreca, M.L., Bruno, G., Rotondo, A., Rossi, A., Chiricosta, G., Dipaola, R., Sautebin, L., Cuzzocrea, S., and Vigorita, M.G. (2005) 5-Arylidene-2-imino-4-thiazolidinones: design and synthesis of novel anti-inflammatory agents, *Bioorg. Med. Chem.*, 13, 4243-4252.

**24.** Shelke ,K. F., Sapkal, S. B., Kakade, G. K., Sadaphal, S. A., Shingate, B. B., and Shingare, M. S. (2010) Alum catalyzed simple and efficient synthesis of 5-Arylidene-2,4-thiazolidinedione in aqueous media, *Green Chemistry Letters and Reviews*, 3(1), 17-21.

**25.** Garg, A., Chawla, P., Panjwani, D., and Saraf, S. A. (2011) Synthesis of some Novel 5-substituted Arylidene-2,4- Thiazolidinediones as bioactive agents, *International Journal of Pharmaceutical Sciences and Nanotechnology*, 4(1), 1373-1378.

**26.** Malik, N., and Prasad, D. N. (2012) Synthesis and Antimicrobial evaluation of N-Substituted-5-Benzylidene-2,4-Thiazolidinedione derivatives, *IJPS*, 8(3), 209-214.

**27.** Metwally, N. H., Rateb, N. M., and Zohdi, H. F. (2011) A simple and green procedure for the synthesis of 5-Arylidene-4-Thiazolidinones by grinding, *Green Chemistry Letters and Reviews*, 4(3), 225-228.