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References (54):

1. Alam O, Mullick P, Verma SP, Gilani SJ, Khan SA, Siddiqui N, Ahsan W. Synthesis, anticonvulsant and toxicity screening of newer pyrimidine semicarbazone derivatives. *Eur. J. Med. Chem.* 2010;45(6):2467-72. http://www.ncbi.nlm.nih.gov/pubmed/20211511

2. Almasirad A, Tabatabai SA, Faizi M, Kebriaeezadeh A, Mehrabi N, Dalvandi A, Shafiee A. Synthesis and anticonvulsant activity of new 2-substituted-5-[2-(2-fluorophenoxy)phenyl]-1,3,4-oxadiazoles and 1,2,4-triazoles. *Bioorg. Med. Chem. Lett.* 2004;(14):6057-59. http://www.ncbi.nlm.nih.gov/pubmed/15546729

3. Amir M, Asif S, Ali I, Hassan MZ. Synthesis of benzothiazole derivatives having acetamido and carbothioamido pharmacophore as anticonvulsant agents. *Med. Chem. Res.* 2012;21:2661-70. http://link.springer.com/article/10.1007%2Fs00044-011-9791-1#

4. Amnerkar ND, Bhusari KP. Synthesis, anticonvulsant activity and 3D-QSAR study of some prop-2-eneamido and 1-acetyl-pyrazolin derivatives of aminobenzothiazole. *Eur. J. Med. Chem.* 2010;45(1):149-59. http://www.ncbi.nlm.nih.gov/pubmed/19853976

5. Azam F, Alkskas IA, Khokra SL, Prakash O. Synthesis of some novel N4-(naphtha[1, 2-*d*]thiazol-2-yl) semicarbazides as potential anticonvulsants. *Eur. J. Med. Chem.* 2009;44(1): 203-11. http://www.ncbi.nlm.nih.gov/pubmed/18396352

6. Abdel-Aziz M, Abou-Rahma GEA, Hassan AA. Synthesis of novel pyrazole derivatives and evaluation of their antidepressant and anticonvulsant activities. *Eur. J. Med. Chem.* 2009;44(9):3480-7. http://www.sciencedirect.com/science/article/pii/S0223523409000506

7. Beyhan N, Kocyigit-Kaymakcioglu B, Gumru S, Aricioglu F. Synthesis and anticonvulsant activity of some 2-pyrazolines derived from chalcones. *Arab. J. Chem.* (In press). http://www.sciencedirect.com/science/article/pii/S1878535213002372

8. Brunton LL, Lazo JS, Parker KL. Goodman and Gilman's *The Pharmacological Basis of Therapeutics*, 11th edition, McGraw-Hill Medical Publishing Division: 2006; 610-11. http://www.amazon.in/Goodman-Gilmans-Pharmacological-Therapeutics-Eleventh-ebook/dp/B001F1640I

9. Campagna F, Carotti A, Casini G, Palluotto F, Genchi G, De Sarro GB. 2-Aryl-2, 5-dihydropyridazino[4,3-*b*]indol-3(3*H*)ones: Novel rigid planar benzodiazepine receptor ligands. *Bioorg. Med. Chem.* 1993;1(6):437-46. http://www.sciencedirect.com/science/article/pii/S0968089600821549

10. Chen J, Sun X-Y, Chai K-Y, Lee J-S, Song M-S, Quan Z-S. Synthesis and anticonvulsant evaluation of 4-(4-alkoxylphenyl)-3-ethyl-4*H*-1,2,4-triazoles as open-chain analogues of 7-alkoxyl-4,5-dihydro[1,2,4]triazolo[4,3-*a*]quinolones. *Bioorg. Med. Chem.* 2007;15(21): 6775-81. http://www.sciencedirect.com/science/article/pii/S096808960700689X

11. Chimirri A, Sarro AD, De Sarro G, Gitto R, Zappala M. Synthesis and anticonvulsant properties of 2,3,3a,4-tetrahydro-1*H*-pyrrolo(1,2-*a*)benzimidazol-1-one-derivatives. *Farmaco* 2001;56(11):821-6. http://www.sciencedirect.com/science/article/pii/S0014827X01011478

12. Curry WJ, Kulling DL. Newer antiepileptic drugs: gabapentin, lamotrigine, felbamate, topiramate and fosphenytoin. *Am. Fam. Physician* 1998;57(3):513-20. http://www.aafp.org/afp/1998/0201/p513.html

13. Dawood KM, Abdel-Gawad H, Rageb EA, Ellithey M, Mohamed HA. Synthesis, anticonvulsant, and anti-inflammatory evaluation of some new benzotriazole and benzofuran-based heterocycles. *Bioorg. Med. Chem.* 2006;14(11):3672-80. http://www.ncbi.nlm.nih.gov/pubmed/16464601

14. Deng XQ, Quan LN, Song MX, Wei CX, Quan ZS. Synthesis and anticonvulsant activity of 7-phenyl-6,7-dihydro-[1,2,4]triazolo[1,5-*a*]pyrimidin-5(4*H*)-ones and their derivatives. *Eur. J. Med. Chem.* 2011;46(7):2955-63. http://www.ncbi.nlm.nih.gov/pubmed/21536355

15. Fisher RS, van Emde Boas W, Blume W, Elger C, Genton P, Lee P, Engel J Jr. Epileptic seizures and epilepsy: definitions proposed by the International League Against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE). *Epilepsia* 2005;46(4):470-2. http://www.ncbi.nlm.nih.gov/pubmed/15816939

16. Falco JL, Lloveras M, Buira I, Teixido J, Borrell JI, Mendez E, Terencio J, Palomer A, Guglietta A. Design, synthesis and biological activity of acyl substituted 3-amino-5-methyl-1,4,5,7-tetrahydropyrazolo[3,4-*b*]pyridin-6-ones as potential hypnotic drugs. *Eur. J. Med. Chem.* 2005;40(11):1179-87. http://www.ncbi.nlm.nih.gov/pubmed/16095764

17. Gadegoni H, Manda S. Synthesis and screening of some novel substituted indoles contained 1,3,4-oxadiazole and 1,2,4-triazole moiety. *Chin. Chem. Lett.* 2013;24(2):127-30. http://www.sciencedirect.com/science/article/pii/S1001841713000028

18. Gavernet L, Barrios IA, Sella Cravero M, Bruno-Blanch LE. Design, synthesis, and anticonvulsant activity of some sulfamides. *Bioorg. Med. Chem. Lett.* 2007;15(16):5604-14. http://www.sciencedirect.com/science/article/pii/S0968089607004415

19. Hassan MZ, Khan SA, Amir M. Design, synthesis and evaluation of N-(substituted benzothiazol-2-yl)amides as anticonvulsant and neuroprotective. *Eur. J. Med. Chem.* 2012; 58(12):206-13. http://www.ncbi.nlm.nih.gov/pubmed/23124217

20. Jia J, Lu D. Herranz JL. Ethyl 1-(2,6-difluorobenzyl)-1*H*-1,2,3-triazole-4-carboxylate. *Acta Crystallogr. Sect. E. Struct. Rep. Online* 2011;67(1):o127. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3050293/

21. Jimonet P, Audiau F, Barreau M, Blanchard JC, Boireau A, Bour Y, Coleno MA, Doble A, Doerflinger G, Huu CD, Donat MH, Duchesne JM, Ganil P, Gueremy C, Honor E, Just B, Kerphirique R, Gontier S, Hubert P, Laduron PM, Le Blevec J, Meunier M, Miquet J-M, Nemecek C, Pasquet M, Piot O, Pratt J, Rataud J, Reibaud M, Stutzmann J-M, Mignani S. Riluzole Series. Synthesis and in vivo "Antiglutamate" activity of 6-substituted-2-benzothiazolamines and 3-substituted-2-imino-benzothiazolines. *J. Med. Chem.* 1999; 42(15):2828-43. http://pubs.acs.org/doi/abs/10.1021/jm980202u\

22. Kaushik D, Khan SA, Chawla G, Kumar S. *N*'-[(5-Chloro-3-methyl-1-phenyl-1*H*-pyrazol-4-yl) methylene] 2/4-substituted hydrazides: Synthesis and anticonvulsant activity. *Eur. J. Med. Chem.* 2010;45(9):3943-9. http://www.ncbi.nlm.nih.gov/pubmed/20573423

23. Kumar P, Shrivastava B, Pandeya SN, Tripathi L, Stables JP. Design, synthesis, and anticonvulsant evaluation of some novel 1,3-benzothiazol-2-yl hydrazones/aceto-hydrazones. *Med. Chem. Res.* 2012;21(9):2428-42. http://link.springer.com/article/10.1007%2Fs00044-011-9768-0#

24. Lankau H-J, Unverferth K, Grunwald C, Hartenhauer H, Heinecke K, Bernoster K, Dost R, Egerland U, Rundfeldt C. New GABA-modulating 1,2,4-oxadiazole derivatives and their anticonvulsant activity. *Eur. J. Med Chem.* 2007;42(6):873-9. http://www.sciencedirect.com/science/article/pii/S0223523407000165

25. Navale A, Pawar S, Deodhar M, Kale A. Synthesis of substituted benzo[*d*]thiazol-2-ylcarbamates as potential anticonvulsants. *Med. Chem. Res.* 2013;22(9):4316-21. http://link.springer.com/article/10.1007%2Fs00044-012-0434-y#

26. Palluotto F, Carotti A, Casini G, Campagna F, Genchi G, Rizzo M, De Sarro GB. Structure-activity relationships of 2-aryl-2,5-dihydropyridazino[4,3-*b*]indol-3(3*H*)-ones at the benzodiazepine receptor. *Bioorg. Med. Chem.* 1996;4(12):2091-104. http://www.sciencedirect.com/science/article/pii/S0968089696002209

27. Pattan SR, Purohit SS, Rasal VP, Mallya S, Marihal SC, Khade AB, Paschapur MS. Synthesis and pharmacological screening of some 1,4-dihydropyridine and their derivatives for anticonvulsant activity. *Ind. J. Chem.* 2008;47B(04):626-9. http://nopr.niscair.res.in/bitstream/123456789/1444/1/IJCB%2047B%284%29%20%282008%29%20626-629.pdf

28. Piao FY, Han RB, Zhang W, Zhang WB, Jiang RS. Synthesis and anticonvulsant activity of 8-alkoxy-5,6-dihydro-4*H*-[1,2,4]triazolo[4,3-*a*][1]benzazepin-1-one derivatives. *Eur. J. Med. Chem.* 2011;46(4):1050-5. http://www.ncbi.nlm.nih.gov/pubmed/21303724

29. Plech T, Luszczki JJ, Wujec M, Flieger J, Pizon M. Synthesis, characterization and preliminary anticonvulsant evaluation of some 4-alkyl-1,2,4-triazoles. *Eur. J. Med. Chem.* 2013;60:208-15. http://www.ncbi.nlm.nih.gov/pubmed/23291122

30. Prasanthi G, Prasad K, Bharathi K. Design, synthesis and evaluation of dialkyl 4-(benzo[*d*][1,3]dioxol-6-yl)-1,4-dihydro-2,6-dimethyl-1-substituted pyridine-3,5-dicarboxylates as potential anticonvulsants and their molecular properties prediction. *Eur. J. Med. Chem.* 2013;66:516-25. http://www.ncbi.nlm.nih.gov/pubmed/23831812

31. Praveen C, Ayyanar A, Perumal PT. Practical synthesis, anticonvulsant, and antimicrobial activity of N-allyl and N-propargyl di(indolyl)indolin-2-ones. *Bioorg. Med. Chem. Lett.* 2011;21(13):4072-7. http://www.ncbi.nlm.nih.gov/pubmed/21621411

32. Ragavendran JV, Sriram D, Patel SK, Reddy IV, Bharathwajan N, Stables J, Yogeeswari P. Design and synthesis of anticonvulsants from a combined phthalimide-GABA-anilide and hydrazone pharmacophore. *Eur. J. Med. Chem.* 2007;42(2):146-51. http://www.ncbi.nlm.nih.gov/pubmed/17011080

33. Raj M, Veerasamy N, Singh VK. Highly enantioselective synthesis of 3-cycloalkanone-3-hydroxy-2-oxindoles, potential anticonvulsants. *Tetrahedron Lett.* 2010;51(16):2157-9. http://www.sciencedirect.com/science/article/pii/S0040403910002844

34. Rajak H, Deshmukh R, Veerasamy R, Sharma AK, Mishra P, Kharya MD. Novel semicarbazones based 2,5-disubstituted-1,3,4-oxadiazoles: One more step towards establishing four binding site pharmacophoric model hypothesis for anticonvulsant activity. *Bioorg. Med. Chem. Lett.* 2010;20(14):4168-72. http://www.ncbi.nlm.nih.gov/pubmed/20558061

35. Rana A, Siddiqui N, Khan SA, Haque SE, Bhat MA. N-{[(6-Substituted-1,3-benzothiazole-2-yl)amino]carbonothioyl}-2/4-substituted benzamides: Synthesis and pharmacological evaluation. *Eur. J. Med. Chem.* 2008;43(5):1114-21. http://www.ncbi.nlm.nih.gov/pubmed/17826870

36. Said SA, Amr A-G, Sabry NM, Abdalla MM. Analgesic, anticonvulsant and anti-inflammatory activities of some synthesized benzodiazipine, triazolopyrimidine and bis-imide derivatives. *Eur. J. Med. Chem.* 2009;44(12):4787-92. http://www.ncbi.nlm.nih.gov/pubmed/19682771

37. Salituro FG, Harrison BL, Baron BM, Nyce PL, Stewart KT, Kehne JH, White HS, McDonald IA. 3-(2-Carboxyindol-3-yl)propionic acid-based antagonists of the N-methyl-D-aspartic acid receptor associated glycine binding site. *J. Med. Chem.* 1992;35(10):1791-9. http://www.ncbi.nlm.nih.gov/pubmed/1534125

38. Sarges R, Howard HR, Koe BK, Weissman A. A novel class of "GABAergic" agents: 1-aryl-3-(aminoalkylidene)oxindoles. *J. Med. Chem.* 1989;32(2):437-44. http://www.ncbi.nlm.nih.gov/pubmed/2536440

39. Shaharyar M, Mazumder A, Salahuddin, Garg R, Pandey RD. Synthesis, characterization and pharmacological screening of novel benzimidazole derivatives. *Arab J. Chem.* 2011 (In press). http://www.sciencedirect.com/science/article/pii/S1878535211001183

40. Shingalapur RV, Hosamani KM, Keri RS, Hugar MH. Derivatives of benzimidazole pharmacophore: Synthesis, anticonvulsant, antidiabetic and DNA cleavage studies. *Eur. J. Med. Chem.* 2010;45(5):1753-9. http://www.ncbi.nlm.nih.gov/pubmed/20122763

41. Shukla JS, Saxena S, Rastogi R. Synthesis of some newer 1-hetrocyclic amino/iminomethyl-2-substituted benzimidazoles as a potent CNS, anticonvulsant and monoamineoxidase inhibitory agents. *Curr. Sci.* 1982;51(17):820-22. http://www.currentscience.ac.in/Downloads/article_id_051_17_0817_0820_0.pdf

42. Siddiqui N, Ahsan W. Triazole incorporated thiazoles as a new class of anticonvulsants: Design, synthesis and in vivo screening. *Eur. J. Med. Chem.* 2010;45(4):1536-43. http://www.ncbi.nlm.nih.gov/pubmed/20116140

43. Siddiqui N, Alam MS, Stables JP. Synthesis and anticonvulsant properties of 1-(amino-N-arylmethanethio)-3-(1-substituted benzyl-2, 3-dioxoindolin-5-yl) urea derivatives. *Eur. J. Med Chem.* 2011;46(6):2236-42. http://www.ncbi.nlm.nih.gov/pubmed/21435751

44. Siddiqui N, Pandeya SN, Khan SA, Stables J, Rana A, Alam M, Arshad MF, Bhat MA. Synthesis and anticonvulsant activity of sulphonamide derivatives-hydrophobic domain. *Bioorg. Med. Chem. Lett.* 2007;17(1):255-9. http://www.ncbi.nlm.nih.gov/pubmed/17046248

45. Siddiqui N, Rana A, Khan SA, Bhat MA, Haque SE. Synthesis of benzothiazole semicarbazones as novel anticonvulsants—The role of hydrophobic domain. Bioorg. *Med. Chem. Lett.* 2007;17(15):4178-82. http://www.sciencedirect.com/science/article/pii/S0960894X0700618X

46. Sridhar SK, Pandeya SN, Stables JP, Ramesh A. Anticonvulsant activity of hydrazones, Schiff and mannich bases of isatin derivatives. *Eur. J. Pharm. Sci.* 2002;16(3):129-32. http://www.ncbi.nlm.nih.gov/pubmed/12128166

47. Tripathi L, Singh R, Stables JP. Design and synthesis of N'-[substituted]pyridine-4-carbohydrazides as potential anticonvulsant agents. *Eur. J. Med. Chem.* 2011;46(2):509-18. http://www.ncbi.nlm.nih.gov/pubmed/21167624

48. Ugale VG, Patel HM, Wadodkar SG, Bari SB, Shirkhedkar AA, Surana SJ. Quinazolino-benzothiazoles: Fused pharmacophores as anticonvulsant agents. *Eur. J. Med. Chem.* 2012; 53:107-13. http://www.ncbi.nlm.nih.gov/pubmed/22534186

49. Ulloora S, Adhikari AV, Shabaraya R. Synthesis and antiepileptic studies of new imidazo[1,2-*a*]pyridine derivatives. *Chin. Chem. Lett.* 2013;24(9):853-6. http://www.sciencedirect.com/science/article/pii/S1001841713003021

50. Ulloora S, Shabaraya R, Aamir S, Adhikari AV. New imidazo[1,2-a]pyridines carrying active pharmacophores: Synthesis and anticonvulsant studies. *Bioorg. Med. Chem. Lett.* 2013; 23(5):1502-6. http://www.ncbi.nlm.nih.gov/pubmed/23352511

51. Wang SB, Deng XQ, Zheng Y, Yuan YP, Quan ZS, Guan LP. Synthesis and evaluation of anticonvulsant and antidepressant activities of 5-alkoxytetrazolo[1,5-*c*]thieno[2,3-*e*]pyrimidine derivatives. *Eur. J. Med. Chem.* 2012;56:139-44. http://www.ncbi.nlm.nih.gov/pubmed/22982524

52. Yang J, Gharagozloo P, Yao J, Ilyin VI, Carter RB, Nguyen P, Robledo S, Woodward RM, Hogenkamp DJ. 3-(4-Phenoxy phenyl)pyrazoles: A novel class of sodium channel blockers. *J. Med. Chem.* 2004;47(6):1547-52. http://www.ncbi.nlm.nih.gov/pubmed/14998340

53. Yogeeswari P, Sriram D, Saraswat V, Ragavendran JV, Mohan Kumar M, Murugesan S, Thirumurugan R, Stables JP. Synthesis and anticonvulsant and neurotoxicity evaluation of N4-phthalimido phenyl (thio) semicarbazides. *Eur. J. Pharm. Sci.* 2003;20(3):341-6. http://www.ncbi.nlm.nih.gov/pubmed/14592700

54. Zarghi A, Tabatabai SA, Faizi M, Ahadian A, Navabi P, Zanganeh V, Shafiee A. Synthesis and anticonvulsant activity of new 2-substituted-5-(2-benzyloxyphenyl)-1,3,4-oxadiazoles. *Bioorg. Med. Chem. Lett.* 2005;15(7):1863-5. http://www.ncbi.nlm.nih.gov/pubmed/15780622