



An Insight into Patents of Thiazolidinone Derivatives

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ABSTRACT: Thiazolidinone derivatives have been a subject of continued exploration by the scientific community throughout the globe due to their diverse biological and other actions. Several methods for their synthesis have been reported in scientific literature. Biological screening of these compounds has shown that they possess a considerable potential as possible pharmacological agents. Several patents have also been granted related to these compounds. An earnest attempt has been made in this paper to compile important patents of thiazolidinone derivatives. We hope that the information provided in this paper will be useful and interesting to the prospective researchers and medicinal chemists involved in this arena. © 2014 iGlobal Research and Publishing Foundation. All rights reserved.

KEYWORDS: Heterocycle; Thiazolidinone; Patent.

INTRODUCTION

In the recent past, there has been a considerable interest and enthusiasm in developing novel small heterocyclic moieties possessing significant biological activities. The presence of thiazole moiety in the structure of several naturally occurring molecules with important antibiotic, immunosuppressive and antitumor activities has been well known for long [1,2].

Small ring heterocycles containing nitrogen, sulfur and oxygen have been under investigation for a long time because of their important medicinal properties [3]. Thiazolidinone template is one of the privileged structural fragments in modern medicinal chemistry having broad pharmacological spectrum and affinity for various biotargets [4]. The presence of thiazolidinone moiety in the structure of several naturally occurring molecules with important antibiotic, immunosuppressive and antitumor activities has been known for several years. Many thiazolidinone derivatives have shown excellent bactericidal, fungicidal, anthelmintic, anticonvulsant and anticancer activities [5].

Some derivatives of 4-thiazolidinones can be used for treatment of cardiac diseases. Modifications on 2,3 and 5 positions of 4-thiazolidinone give out antidiabetic drugs and potent aldose reductase inhibitors, which are used in the treatment of diabetic complications like cataracts, neuropathy, nephropathy etc [6].

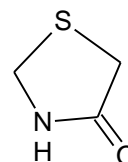


Figure-1

4-Thiazolidinones are derivatives of thiazolidine with a carbonyl group at the 4th position. Substituents at the 2, 3 and 5 positions may be varied, but the

greatest difference in structure and properties is exerted by the group attached to the carbon atom at the 2nd position. Variations in the substituents attached to the nitrogen atom and the methylene carbon atom are possible [7].

The diverse and significant activity profile of thiazolidinones has established them as pharmacologically most active scaffolds. A large number of biological activities such as antimicrobial [8], anticonvulsant [9], antitubercular [10], anticancer [11,12], anti-inflammatory and analgesics [13,14], anti-HIV [15,16], antioxidant [17] activities etc., have been reported to be associated with thiazolidinone [18].

PATENTS RELATED TO THIAZOLIDINONES

The development of new synthetic methods leading to structures, which incorporates various biologically active moieties in a single molecule, has attracted much attention in organic chemistry. In particular, heterocyclic compounds hold a special place among pharmaceutically active products, and the development of simple and efficient synthesis of compounds incorporating multi heterocyclic rings has given a new dimension to the drug discovery [19]. Over the past few decades, number of patents has been issued in the field of thiazolidinones with a varied range of biological and other activities. The present paper is an earnest attempt to compile the important patents granted to thiazolidinone derivatives, with an objective that the information provided herein will be useful to the prospective researchers in this field.

Table 1. Different Patents Filed on Thiazolidinone Derivatives

Sr. No.	Date	Patent Number	Invention Disclosed	Reference
1)	Feb/21/2012	US 8119812 B2	The compounds of the invention inhibited the CDC7 protein kinase activity, and suppression of cell proliferation.	20
2)	Aug/23/2011	US 8003678 B2	Therapeutic methods, compositions, and medicaments related thereto of thiazolidinones, oxazolidinones and related compounds are disclosed	21
3)	Aug/04/2011	US 2010190299 A1	Novel thiazolidinone derivative having a CDC7 inhibitory action.	22
4)	Feb/17/2011	US 0039849 A1	5-Substituted-2-imino-thiazolidinone compounds and their use as inhibitors of bacterial infection	23
5)	Aug/31/2010	US 7786117 B2	Therapeutic substituted thiazolidinones, oxazolidinones and related compounds	24
6)	Aug/24/2010	US 7781465 B2	Therapeutic methods, compositions, and medicaments related to oxazolidinones and thiazolidinones have been described	25
7)	Feb/16/2010	US 7662842 B2	Thiazolidinones amides, thiazolidine carboxylic acidamides, and serine amides including polyamine conjugates thereof, as selective anti-cancer agents	26
8)	Oct/23/2008	US 20080261980 A1	The invention describes the use of compounds for the preparation of pharmaceutical compositions for the treatment of pathologies in which inhibition of the interaction between HIF-1 α and p300 is beneficial, in particular as antiangiogenic medicaments for the therapy of solid tumors.	27
9)	Mar/22/2007	US 0066597 A1	Thiazolidinone, oxazolidinone, imidazolone derivatives for treating lower urinary tract and related disorders	28
10)	Feb/15/2007	US 0037862 A1	Thiazolidinones, their production and uses as pharmaceutical agents as inhibitors of polo kinases in cancer, auto-immune diseases, cardiovascular diseases	29
11)	Jan/30/2007	US 7169782 B2	Aryl substituted thiazolidinones and the use thereof	30
12)	Jan/18/2007	US 0015759 A1	Metasubstituted thiazolidinones, their manufacture and use as a drug	31
13)	Jan/11/2007	US 0010565 A1	New thiazolidinones without basic nitrogen, their	32

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			production and use as pharmaceutical agents	
14)	Jan/11/2007	US 0010566 A1	Thiazolidinones without basic nitrogen, their production and use as pharmaceutical agents	33
15)	Apr/13/2006	US 0079503 A1	Thiazolidinones and the use thereof as polo-like kinase inhibitors	34
16)	Feb/23/2006	US 0040998 A1	Thiazolidinone amides, thiazolidine carboxylic acid amides, methods of making, and uses thereof	35
17)	Jul/07/2005	US 0148587 A1	Thiazolidinones, oxazolidinone, and imidazolone derivatives for treating lower urinary tract and related disorders	36
18)	May/26/2005	US 0113421	Thiazolidinones, oxazolidinone, and imidazolone derivatives for treating non-inflammatory gastrointestinal tract disorder	37
19)	Nov/23/2004	US 6821991 B2	2-Substituted thiazolidinones as beta-3 adrenergic receptor agonists	38
20)	Sep/09/2004	US 0176364 A1	Aryl substituted thiazolidinones and the use thereof	39
21)	May/20/2004	US 0097566 A1	2-Substituted thiazolidinone and oxazolidinone derivatives for the inhibition of phosphatases and the treatment of cancer	40
22)	Jun/24/2003	US 6583140 B2	2-Substituted thiazolidinones as beta-3 adrenergic receptor agonists	41
23)	Jan/14/2003	US 6506751 B1	Thiazolidinone compounds useful as chemokine inhibitors	42
24)	Sept/04/2001	US 6284775 B1	3-[4-Substituted-4-piperazinyl)butyl]-thiazolidin-4-one and related compounds	43
25)	Aug/27/1996	US 5549974	Methods for the solid phase synthesis of thiazolidinones, metathiazanones and derivatives thereof	44
26)	Dec/26/1995	US 5478852	Use of thiazolidindione derivatives and related antihyperglycemic agents in the treatment of impaired glucose tolerance in order to prevent or delay the onset of noninsulin-dependent diabetes mellitus	45
27)	Oct/10/1995	US 5457109	Use of thiazolidinedione derivatives and related antihyperglycemic agents in the treatment of disease states at risk for progeressing to noninsulin-dependent diabetes mellitus	46
28)	Dec/06/1994	US 5371087	Thiazolidinones derivatives as antipsychotic, analgesics, anticonvulsant and anxiolytic agent have been described	47
29)	Jul/20/1993	US 5229388	3-[4-(1-Substituted-4-piperazinyl) butyl]-4-thiazolidinone and related compounds	48
30)	May/04/1993	US 5208250	Known and selected novel arylmethylenyl derivatives of thiazolidinones, imidazolidinones and oxazolidinonesuseful as antiallergy agents and anti-inflammatory agents	49
31)	Sep/01/1992	US 5143929	2-Substituted thiazolidinone, oxazolidinone, and imidazolidinone as anti-inflammatory agents	50
32)	Sep/01/1992	US 5143928	3,5-Di-tertiarybutyl-4-hydroxy-phenylmethylene derivatives of substituted thiazolidinones, oxazolidinones, and imidazolidinones as anti-inflammatory agents	51
33)	Aug/04/1992	US 5136037	3-[4-(Substituted-4-piperazinyl)butyl]-4-thiazolidinone and compounds	52
34)	Oct/29/1991	US 5061720	Novel substituted 4-thiazolidinone derivatives having cyclooxygenase and 5-lipoxygenase inhibiting properties and which are topical	53

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			antiinflammatory agents for infammed conditions of the skin	
35)	Aug/06/1991	US 5037984	3-[4-(1-substituted-4-piperaziny)-butyl]-4-thiazolidinone compounds	54
36)	Oct/10/1989	US 4873255	Thiazolidinone derivatives, their preparation and their use	55
37)	May/12/1987	US 4664694	Substituted thiazolidinones useful as plant growth regulators. Compound is useful in regulating the growth of plants and can be formed int a composition, useful in this application. The composition comprises the compound having the structural formula given above and an inert carrier therefor.	56
38)	Jan/27/1987	US 4639460	Fungicidal substituted N-(1-iodopropargyl) thiazolidinones have been disclosed.	57
39)	Aug/13/1985	US 4535164	Process for preparing certain substituted 4-thiazolidinones in an aprotic reaction medium in the presence of a metal catalyst.	58
40)	April/17/1984	US 4443455	A process for combating plant fungi with a thiazolidinone having pesticidal and plant growth regulating properties; and to methods for making them have been disclosed,	59
41)	April/17/1984	US 4443454	This invention relates to thiazolidinone compounds, having pesticidal and plant growth regulating properties; and to methods for making them.	60
42)	Dec/13/1977	US 4062859	The preparation and use of halogenated 3-isothiazolidinone 1-oxides and 1,1-dioxides are disclosed. These compounds and compositions containing them are useful in controlling weeds and microorganisms such as bacteria, fungi, algae and the like.	61
43)	Oct/11/1977	US 4053471	4-Thiazolidinone derivatives, their synthesis and bioigoical importance have been described.	62
44)	Jun/29/1976	US 3912749	2-(Carbamoyloximino)-4-thiazolidinone compounds as insecticidal, miticidal or nematocidal agents	63
45)	Dec/10/1974	US 3853902	Haloalkyl-4-thiazolidinone useful as plasticizers and in some instances as plant hormones.	64
46)	April/28/1970	US 3509231	Oxazolidinones and thiazolidinones as latent catalytsfor curing polyepoxide resins have been described	65
47)	Mar/14/1967	US 3309377	3-[(2-oxazolidinone-3-yl)-alkyl]-4-thiazolidinones and their preparation	66
48)	Jun/01/1965	US 3187002	The substituted 4-thiazolidinones of this invention have been found to have interesting pharmacological activity as analgesics, sedatives, anti-inilammatory agents and choleric agents. In use, they may be formulated with conventional pharmaceutical carriers to form such typical dosage units as tablets, capsules, solutions, suspensions, suppositories and the like. These new and novel compounds are also valuable intermediates useful in the production of additional new and novel 4-thiazolidinones and bis(4-thiazolidinones) which in turn have interesting pharmacological activity.	67
49)	May/04/1965	US 3182063	Describes compositions of matter classified in the art of chemistry as substituted 4-thiazolidinones and to processes for making such compositions	68
50)	Jan/08/1963	US 3072653	5-Amino derivative of 4-thiazolidinones and process	69

			therefor	
51)	Jan/08/1963	US 3072670	Amides of substituted 4-thiazolidinones and process therefor	70
52)	Jan/08/1963	US 3072671	Describes synthesis of new and novel substituted bis(4-thiazolidinones) and process therefor	71

INTRODUCTION

A large number of patents have been granted to thiazolidinones and their derivatives in diverse fields. Important patents of last five decades have been compiled herein, which demonstrate the versatile utility of these compounds. It is evident that thiazolidinones have been a subject of significant interest of medicinal chemist and other researchers. A number of scientific endeavours have been undertaken to harness the maximum potential of this moiety. It is anticipated that further scientific and systematic research on these compounds will enable the researchers to utilize the maximum therapeutic potential of these agents.

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