

Supplement II. Patents from the Woodward Research Institute*

- R. B. Woodward and K. Heusler, "Process for the Manufacture of Amino Compounds," AU1719970, 19700706, 1970-01-13.
- R. B. Woodward and K. Heusler, "Certain 4-Thia-2,6-diazabicyclo[3.2.0]heptane Derivatives," DE1935970, 19690715, 1970-01-29.
- R. B. Woodward and K. Heusler, " α -Hydroxy-2-oxo-1-azetidinemethanecarboxylic Acids — Intermediates for Pharmaceuticals, e.g. Antibiotics," CH500233, 19680723, 1970-12-15.
- R. B. Woodward and K. Heusler, (no title furnished), DE2032827, 19700702, 1971-01-14.
- R. B. Woodward and K. Heusler, "2-Hydroxy-3-,3-dimethyl-6-acylamino-4-thia-1-azabicyclo[3.2.0]heptan-7-ones and Their Esters Useful as Intermediates for Antibacterials," CH507936, 19700702, 1971-05-31.
- R. B. Woodward and K. Heusler, "Process for the Manufacture of Amino Compounds," ZA7004468, 19700630, 1971-05-31.
- R. B. Woodward and K. Heusler, " α -Hydroxy-2-oxo-1-azetidinemethanecarboxylic acids — Intermediates for Pharmaceuticals, e.g. Antibiotics," CH510013, 19680723, 1971-07-15.
- R. B. Woodward and K. Heusler, " α -Hydroxy-2-oxo-1-azetidinemethanecarboxylic Acids — Intermediates for Pharmaceuticals, e.g. Antibiotics," CH511833, 19680723, 1971-08-31.
- R. B. Woodward and K. Heusler, "Oxyacetic Acid Compounds and Process for Their Manufacture," CA880919, (no date furnished), 1971-09-14.
- R. B. Woodward and K. Heusler, "1-R²-2- α -Isopropenylmercapto-3- α -N-acylaminoazetidine-4-ones as Antibacterial Agents," CH512513, 19681211, 1971-09-15.
- R. B. Woodward, I. Ernest, and K. Heusler, "Thiazabicyclic compounds, Process for Their Manufacture, and Compositions Containing Them," CA899862, (no date furnished), 1972-05-09.
- R. B. Woodward and K. Heusler, "Acyloxyalkylmercapto Compounds and Process for Their Manufacture," CA908180, (no date furnished), 1972-08-22.
- R. B. Woodward and K. Heusler, "Carbinoalkylmercapto Compounds and Process for Their Manufacture," CA908179, (no date furnished), 1972-08-22.
- R. B. Woodward and K. Heusler, "Isopropenylmercapto-3- α -acylaminoazetidine-4-ones," US3703512, 19690715, 1972-11-21.
- R. B. Woodward and K. Heusler, "Thiazacyclic Hydroxy Compounds and Process for Their Manufacture," US3705160, 19690715, 1972-12-05.

* An advanced search of the Espacenet database furnished the 90 patent references shown here. The search terms were *Woodward*, 1963–1986, and CIBA. Patents are arranged in ascending numerical order of publication date. The application and publication dates of each patent are represented by *yyyymmdd* and *yyyy-mm-dd*, respectively. Emboldened references refer to process patents covering intermediates in Woodward's Prostaglandin F_{2 α} synthesis. The database URL is https://worldwide.espacenet.com/advancedSearch?locale=en_EP.

- R. B. Woodward and K. Heusler, "1-Formyl-2- α -(2-acyloxy-2-propylmercapto)-3- α -N-acylaminoazetid-4-ones and Process for Their Manufacture," US3711464, 19690718, 1973-01-16.
- R. B. Woodward and K. Heusler, "Process for The Manufacture of Thiazacyclic Hydroxy Compounds," US3716465, 19701123, 1973-02-13.
- R. B. Woodward and K. Heusler, "Thiazacyclic Hydroxy Compounds and Process for Their Manufacture," CA921909, 19700121, 1973-02-27.
- R. B. Woodward and K. Heusler, "Process for the Manufacture of Amino Compounds," CA921906, 19700707, 1973-02-27.
- R. B. Woodward and K. Heusler, "Thiazacyclic Hydroxy Compounds and Process for Their Manufacture," CA921905, 19690716, 1973-02-27.
- R. B. Woodward and H. Bickel, "4-Substituted Methylene-7-amino-8-oxo-5-thia-1-azabicyclo[4.2.0]oct-2-ene-2-carboxylic Acids," US3719672, 19691202, 1973-03-06.
- R. B. Woodward, "A Novel Dioxatricyclodecanol, its Esters, and a Process for their Manufacture" DE2305085, 19730202, 1973-08-16.**
- R. B. Woodward, "A Novel Hydroxymethyldioxabicyclononene, its Esters, and a Process for their Manufacture," DE2305084, 19730202, 1973-08-16.**
- R. B. Woodward "A Novel Dioxabicyclononanediol, its Esters, and a Process for their Manufacture," DE2305083, 19730202, 1973-08-16.**
- R. B. Woodward, "Novel Trioxatricycloundecane Dederivatives, and Processes for their Manufacture," DE2305082, 19730202 1973-08-16.**
- R. B. Woodward, "Novel Dioxatricyclodecenes, and Processes for their Manufacture," DE2305081, 19730202, 1973-08-16.**
- R. B. Woodward and K. Heusler, "Process for the Manufacture of 6-Acylamino-2,2-dimethyl-3-hydroxy Penam Compounds," US3808201, 19710526, 1974-04-30.
- R. B. Woodward, "2-Thiacepham and -cephem-4-carboxylic Acids," US3835130, 19711029, 1974-09-10.
- R. B. Woodward and K. Heusler, "Certain 2 α -(2-Hydroxymethyl-2-propylmercapto)-3-aminoazetid-4-one Compounds," US3842072, 19730314, 1974-10-15.
- R. B. Woodward, R. Scartazinni, H. Bickel, and K. Heusler, "Certain Bis-(3-amino-2-oxo-1-azetidiny)-disulfides," US3880833, 19711012, 1975-04-29.
- R. B. Woodward, (No title available), DK522774, 19741004, 1975-05-26.
- R. B. Woodward, "Dioxatricyclodecenes," US3898248, 19730202, 1975-08-05.**
- R. B. Woodward, "Esters of Hydroxymethyldioxabicyclononene," US3900500, 19730202, 1975-08-19.**
- R. B. Woodward, "Bicyclononane Diol and Esters," US3901919, 19730202, 1975-08-26.**
- R. B. Woodward, "New Oxabicyclononanes," US3914258, 19730202, 1975-10-21.**

- R. B. Woodward, "Dioxatricyclodecanol, Esters Thereof, and Process for their Manufacture," US3919249, 19730202, 1975-11-11.**
- R. B. Woodward and H. Bickel, "Methodikverfahren zur Herstellung von Methylderivaten," DE2528044, 19750624, 1976-01-08.
- R. B. Woodward and H. Bickel, "Process for The Manufacture of Enol Derivatives," ZA7501154, 19750225, 1976-02-25.
- R. B. Woodward, "Dioxatricyclodecanes and Process for Their Manufacture," US3941813, 19730202, 1976-03-02.**
- R. B. Woodward, "Oxabicyclooctanes and Process for Their Manufacture," US3950362, 19730202, 1976-04-13.**
- R. B. Woodward and H. Bickel, "Process for The Manufacture of Enol Derivatives," ZA7601014, 19760219, 1977-01-26.
- R. B. Woodward, I Ernest, and J. Gosteli, "Process for the Preparation of Bicyclic Unsaturated Thiaziaza Compounds," SE7613738, 19761207, 1977-06-09.
- R. B. Woodward and K. Heusler, "Oxyacetic Acid Conpounds and Process for Their Manufacture," US4052408, 19741118, 1977-10-04.
- R. B. Woodward, I Ernest, and J. Gosteli, "2-Penem Compounds," US4070477, 19761202, 1978-01-24.
- R. B. Woodward and H. Bickel, "7-Amino-3-hydroxy-2(or 3)-cephem-4-carboxylic Acid Derivatives and Preparation," CH601224, 19770226, 1978-06-30.
- R. B. Woodward and H. Bickel, "7-Amino-3-hydroxy-2(or 3)-cephem-4-carboxylic Acid Derivatives and Preparation," CH602635, 19740226, 1978-06-30.
- R. B. Woodward and H. Bickel, "7-Amino-3-hydroxy-2(or 3)-cephem-4-carboxylic Acid Derivatives and Preparation," CH602634, 19740226, 1978-07-31.
- R. B. Woodward and H. Bickel, "3-Methylensmoersyrederivater til Anvendelse Som Mellemprodukter Samt Fremgangsmaade til Fremstilling Deraf," DK348578, 19780807, 1978-08-07.
- R. B. Woodward and H. Bickel, "Azetidine Derivatives," AU3612178; AU518618, 19780515, 1978-08-17.
- R. B. Woodward and H. Bickel, "Process for The Manufacture of Enol Derivatives," US4110533, 19760210, 1978-08-29.
- R. B. Woodward and H. Bickel, "3-Thio-7-amino-3- and-2-cephem-4-carboxylic Acids," CH605999, 19740830, 1978-10-13.
- R. B. Woodward and H. Bickel, "3-Thio-7-amino-3- and-2-cephem-4-carboxylic Acids," CH605998, 19740830, 1978-10-13.
- R. B. Woodward and H. Bickel, "7-Amino-3-hydroxy-2(or 3)-cephem-4-carboxylic Acid Derivatives Preparation," CH605737, 19740226, 1978-10-13.
- R. B. Woodward and H. Bickel, "Process for The Manufacture of Enol Derivatives," EG12302, 19760128, 1978-12-31.

- R. B. Woodward and H. Bickel, "Process for the Manufacture of 7- β -amino-3-cephem-3-ol-4-carboxylic Acid Compounds," US4147864, 19761202, 1979-04-03.
- R. B. Woodward and H. Bickel, "Process for the Manufacture of 7- β -amino-3-cephem-3-ol-4-carboxylic Acid Compounds," CH610584, 19740605, 1979-04-30.
- R. B. Woodward and K. Heusler, " α -Halo-2-oxo-1-azetidinemethanecarboxylic Acid Compounds," US4161476, 19770711, 1979-07-17.
- R. B. Woodward and H. Bickel, "Process for the Preparation of Etherified 2-Azetidinyl-3-hydroxycrotonic Acid Derivatives," CH612422, 19741220, 1979-07-31.
- R. B. Woodward, "Process for the Preparation of 7- β -Aminocephem-3-ol-4-carboxylic Acid Compounds," CH614959, 19741220, 1979-12-28.
- R. B. Woodward, J. Gosteli, I. Ernest, and M. Lang, "6-Substituted Thia-aza Compounds," ZA7900433, 19790201, 1980-02-27.
- R. B. Woodward and H. Bickel, "Process for the Manufacture of 3-Hydroxycrotonic Acid Derivatives," CA1084054, 19790406, 1980-08-19.
- R. B. Woodward and H. Bickel, "Process for the Preparation of Substituted 3-Cephem- or 2-Cephem-3-mercapto-4-carboxylic Acids," CH619232, 19750714, 1980-09-15.
- R. B. Woodward and H. Bickel, "Process for the Manufacture of 3-Methylenebutyric Acid Derivatives," CA1086755, 19790406, 1980-09-30.
- R. B. Woodward, I. Ernest, and J. Gosteli, " α -Ketocarboxylsyreforbindelser til Anvendelse som Mellemprodukter ved Fremstillingen af Bicycliske Thia-azaforbindelser," DK67081, 19810216, 1981-02-16.
- R. B. Woodward, I. Ernest, and J. Gosteli, "Ylidforbindelser til Anvendelse som Mellemprodukter ved Fremstilling af Terapeutisk Virksomme Thia-Azaforbindelser," DK66981, 19810216, 1981-02-16.
- R. B. Woodward and H. Bickel, "Sulfide Intermediates for the Manufacture of Enol Derivatives," US4255328, 19781120, 1981-03-10.
- R. B. Woodward and H. Bickel, "7- β -Amino-3-thio-3-cephem-4-carboxylic Acid Compounds, and Antibacterial Compositions and Methods Using Them," US4256739, 19750826, 1981-03-17.
- R. B. Woodward and H. Bickel, "Process for the Manufacture of Enamine Derivatives," CA1098512, 19800129, 1981-03-31.
- R. B. Woodward and H. Bickel, "Process for the Manufacture of Enol Derivatives," US4301278, 19790326, 1981-11-17.
- R. B. Woodward and H. Bickel, "Process for Preparing Enol Ether Compounds," CH627759 (A5), 19750825, 1982-01-29.
- R. B. Woodward and H. Bickel, "Process for the Preparation of Derivatives of 3-Methylenebutyric Acid," MX4321, 19750221, 1982-03-24.
- R. B. Woodward and H. Bickel, "Process for the Preparation of Intermediate 7- β -amino-3-cephem-3-ol-4-carboxylic Acids," MX4448, 19750221, 1982-05-11.

- R. B. Woodward and H. Bickel, "Process for the Preparation of Intermediate 7- β -amino-3-cephem-3-chloro-4-carboxylic Acids," MX4489, 19750221, 1982-05-21.
- R. B. Woodward, I. Ernest, and J. Gosteli, "Thia-aza Compounds with a β -Lactam Ring," US4331676, 19780504, 1982-05-25.
- R. B. Woodward, I. Ernest, and J. Gosteli, "2-(Oxo-1-azetidiny)-eddikesyre-forbindelser," DK388582, 19820831, 1982-08-31.
- R. B. Woodward, I. Ernest, and J. Gosteli, "4-Thio-2-oxoazetidion-forbindelser," DK388482, 19820831, 1982-08-31.
- R. B. Woodward, I. Ernest, and J. Gosteli, "Ylid-forbindelser," DK398082, 19820906, 1982-09-06.
- R. B. Woodward, I. Ernest, and J. Gosteli, "Penicillansyre-1-oxider," DK399582, 19820907, 1982-09-07.
- R. B. Woodward, I. Ernest, and J. Gosteli, "2-Azetidiny-butensyreEster-Derivater," DK401282, 19820908, 1982-09-08.
- R. B. Woodward, I. Ernest, and J. Gosteli, "2-(2-Oxo-1-azetidiny)-butensyreester-Derivater," DK 404482, 19820909, 1982-09-09.
- R. B. Woodward, I. Ernest, and J. Gosteli, "2-Azetidiny-2-oxoeddikesyreester-Derivater," DK405982, 19820910, 1982-09-10.
- R. B. Woodward, I. Ernest, and J. Gosteli, "Thioazetidionenes," AU544572; AU8123182, 19820309, 1982-09-23.
- R. B. Woodward, I. Ernest, and J. Gosteli, "Bicyclic Unsaturated Thia-aza Compounds and 4-Acylthio Azetidinone Intermediates," US4364865, 19800611, 1982-12-21.
- R. B. Woodward and H. Bickel, "Process for the Manufacture of Sulfonic Acid Esters of 2-(2-Oxoazetidion-1-yl)-hydroxycrotonic Acid Compounds," CA1140555, 19800129, 1983-02-01.
- R. B. Woodward and H. Bickel, "Process for the Manufacture of 2-(2-Oxoazetidion-1-yl)-crotonic Acid Derivatives," CA1140554, 19800129, 1983-02-01.
- R. B. Woodward and H. Bickel, "Cephalosporin derivatives," US4434287, 19811119, 1984-02-28.
- R. B. Woodward, I. Ernest, and J. Gosteli, "Process for Preparing Thia-aza compounds with a β -Lactam Ring," US4500457, 19820301, 1985-02-19.
- R. B. Woodward, "3-Hydroxikrotonsyraderivat till Anvendning Sasom Mellanprodukt vid Syntesen av 3-Cefemforeningar," SE438855; SE7807811, 19780713, 1985-05-13.
- R. B. Woodward and H. Bickel, "Process for the Manufacture of Enol Derivatives," US4550162, 19820930, 1985-10-29.
- R. B. Woodward and H. Bickel, "Process for the Manufacture of Enol Derivatives," US4579684, 19850819, 1986-04-01.