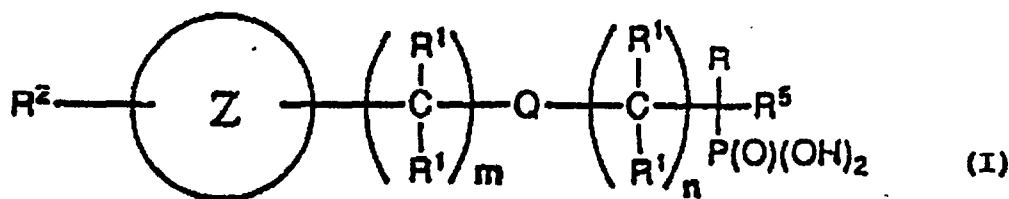




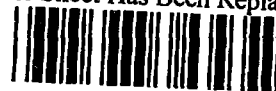
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(54) Title: THIO-SUBSTITUTED NITROGEN-CONTAINING HETEROCYCLIC PHOSPHONATE COMPOUNDS FOR TREATING ABNORMAL CALCIUM AND PHOSPHATE METABOLISM



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(57) Abstract

The present invention relates to thio-substituted, nitrogen-containing heterocyclic phosphonate compounds, including bisphosphonates, phosphonoalkylphosphonates, phosphonocarboxylates, and phosphonosulfonates, and the pharmaceutically-acceptable salts and esters thereof. The present invention further relates to pharmaceutical compositions containing a safe and effective amount of a compound of the present invention, and pharmaceutically-acceptable excipients. Finally, the present invention relates to methods for treating or preventing pathological conditions characterized by abnormal calcium and phosphate metabolism in humans or other mammals, including treating or preventing osteoporosis and arthritis, especially rheumatoid arthritis and osteoarthritis. This method comprises administering to a human or other mammal in need of such treatment of a safe and effective amount of a compound or composition of the present invention. These compounds have general structure (I) in which at least one of R^1 , R^2 , R^3 or R^5 must be SR^6 or R^8SR^6 .