

Penicillins (1st Generation)

Updated: October 20, 2020.

OVERVIEW

The natural or "first generation" penicillins are bactericidal antibiotics naturally derived from the mold, *Penicillium chrysogenum*. Their basic structure includes a thiazolidine ring connected to a beta-lactam ring with a variable side chain. Penicillins bind to bacterial proteins and inhibit synthesis of the bacterial cell wall, causing cell lysis particularly in rapidly growing organisms. Bacterial resistance to penicillin is usually mediated by beta-lactamase, an enzyme which destroys the beta-lactam ring of penicillin, rendering it inactive. Penicillin was introduced into medicine in the 1940's and ushered in the modern era of antibiotic therapy, ending the dominance of many diseases that had been major causes of morbidity and mortality. At present, several first generation penicillins are available in the United States: the benzathine, potassium, procaine and sodium salts of penicillin G and the orally available penicillin V potassium. These agents are discussed together as they are rare causes of hepatotoxicity and can be considered similar enough to be grouped together.

Drug Class: [Antiinfective Agents](#)

The following are links to each drug record:

- [Penicillin G](#)
- [Penicillin G Benzathine](#)
- [Penicillin V](#)

CHEMICAL FORMULAS AND STRUCTURES

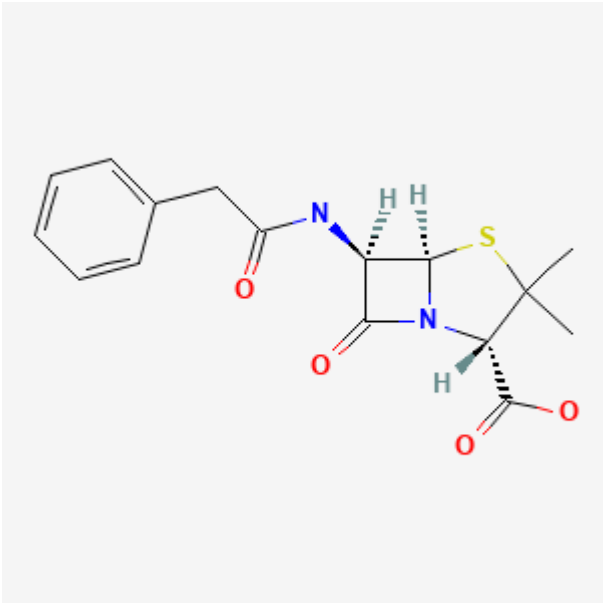
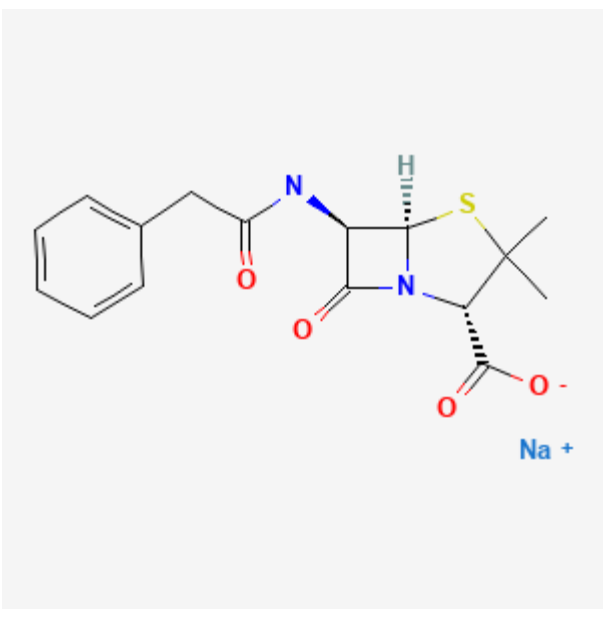
DRUG	CAS REGISTRY NO	MOLECULAR FORMULA	STRUCTURE
Penicillin G (Benzylpenicillin)	61-33-6	C ₁₆ H ₁₈ N ₂ O ₄ S	
Penicillin G Sodium	69-57-8	C ₁₆ H ₁₈ N ₂ O ₄ S	

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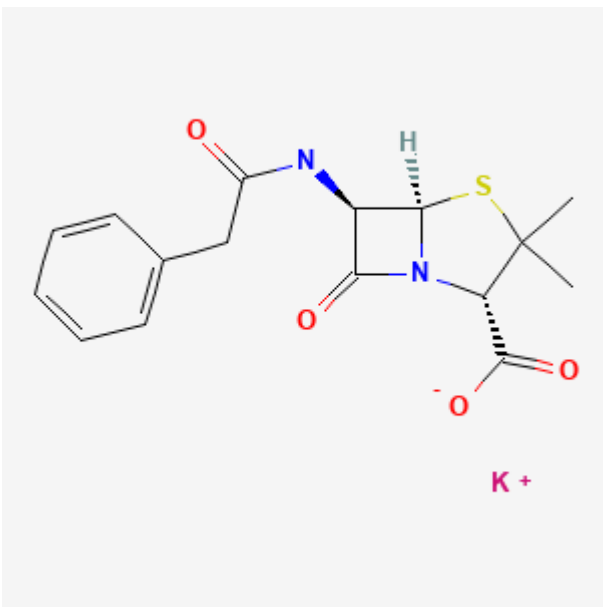
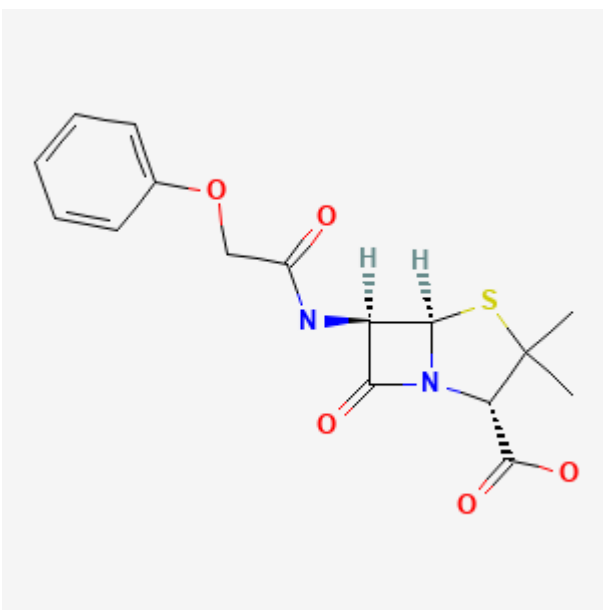
DRUG	CAS REGISTRY NO	MOLECULAR FORMULA	STRUCTURE
Penicillin G Potassium	113-98-4	C ₁₆ H ₁₈ N ₂ O ₄ S.K	 <p>The structure shows the penam nucleus of penicillin G. The 6-position is substituted with a phenylacetamido group (-NH-CO-CH₂-C₆H₅). The 3-position is substituted with a propionic acid side chain (-CH₂-CH₂-COO⁻). A potassium ion (K⁺) is shown in pink below the structure.</p>
Penicillin V	87-08-1	C ₁₆ H ₁₈ N ₂ O ₅ S	 <p>The structure shows the penam nucleus of penicillin V. The 6-position is substituted with a phenoxymethylacetamido group (-NH-CO-CH₂-O-C₆H₅). The 3-position is substituted with a propionic acid side chain (-CH₂-CH₂-COO⁻).</p>

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DRUG	CAS REGISTRY NO	MOLECULAR FORMULA	STRUCTURE
Penicillin V Potassium	132-98-9	C ₁₆ H ₁₇ K-N ₂ O ₅ -S C ₁₆ H ₁₇ -N ₂ O ₅ -S.K C ₁₆ H ₁₈ -N ₂ O ₅ -S.K	