

Chapter-12 | P. Chemistry

Antibiotic

Study of the following category of medicinal compounds with respect to classification, chemical name (IUPAC Name), chemical structure (compounds marked with*) uses, stability and storage conditions, different types of formulations and their popular brand names:

- Antibiotics: Penicillin G, Amoxicillin*, Cloxacillin, Streptomycin,
- Tetracyclines: Doxycycline, Minocycline,
- Macrolides: Erythromycin, Azithromycin, Miscellaneous: Chloramphenicol* Clindamycin

Antibiotics:

- Antibiotics are medications that fight bacterial infections.
- They do this by killing the bacteria or by preventing them from multiplying. Antibiotics are not effective against viral infections, such as the common cold or flu.

Classification of Antibiotics:

By chemical structure, antibiotics can be divided into the following classes:

- Beta-lactams, which include penicillins, cephalosporins, carbapenems, and monobactams. These antibiotics work by inhibiting the synthesis of the bacterial cell wall.
- Macrolides, which include erythromycin, clarithromycin, and azithromycin. These antibiotics work by inhibiting protein synthesis in bacteria.
- Tetracyclines, which include tetracycline, doxycycline, and minocycline. These antibiotics work by inhibiting protein synthesis in bacteria.
- Aminoglycosides, which include gentamicin, tobramycin, and amikacin. These antibiotics work by inhibiting protein synthesis in bacteria.
- Fluoroquinolones, which include ciprofloxacin, levofloxacin, and moxifloxacin. These antibiotics work by inhibiting DNA replication in bacteria.



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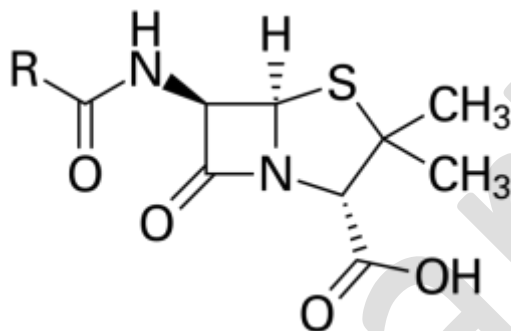
Antibiotics: Penicillin G, Amoxicillin*, Cloxacillin, Streptomycin,

Penicillin G

Chemical Name:

- Benzylpenicillin

Chemical Structure:



Uses:

Penicillin G is a narrow-spectrum antibiotic that is used to treat infections caused by susceptible bacteria, including:

- Streptococcus pneumoniae (strep throat, pneumonia)
- Staphylococcus aureus (boils, cellulitis)
- Neisseria gonorrhoeae (gonorrhea)
- Treponema pallidum (syphilis)

Stability and storage Condition:

It is a stable drug that can be stored at room temperature. However, it should be protected from light and moisture.

Type of Formulation:

- Oral tablets
- Intramuscular injections
- Intravenous injections

Brand name:

- Pfizerpen
- Pen-Vee K
- Bicillin L-A



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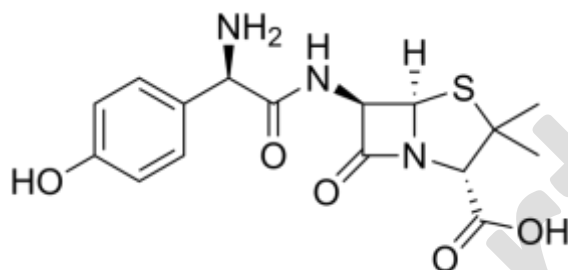
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Amoxicillin*

Chemical Name:

6-[D(-) β -amino-p-hydroxyphenyl-acetamido]-3-hydroxy-7-oxo-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylic acid.

Chemical Structure:



Uses:

Amoxicillin is used to treat a variety of bacterial infections, including:

- Upper respiratory tract infections (e.g., sinusitis, bronchitis, pneumonia)
- Lower respiratory tract infections (e.g., acute otitis media, acute exacerbations of chronic bronchitis)
- Skin and soft tissue infections
- Urinary tract infections
- Gonorrhea

Stability and storage Condition:

It is a stable drug that can be stored at room temperature. However, it should be protected from light and moisture.

Type of Formulation:

- Capsules
- Tablets
- Suspension

Brand name:

- Amoxil
- Polymox
- Trimox



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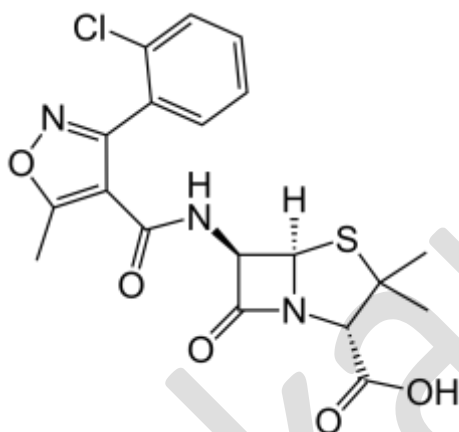
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Cloxacillin

Chemical Name:

(2S,5R,6R)-6-[[3-(2-chlorophenyl)-5-methyl-1,2-oxazole-4-carbonyl]amino]-3,3-dimethyl-7-oxo-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylic acid.

Chemical Structure:



Uses:

Cloxacillin is used to treat a variety of bacterial infections, including:

- Skin infections
- Bone infections
- Respiratory infections
- Gonorrhea
- Sepsis

Stability and storage Condition:

It is a stable drug that can be stored at room temperature. However, it should be protected from light and moisture.

Type of Formulation:

- Capsules
- Tablets
- Injection

Brand name:

- Cloxapen
- Cloxacap



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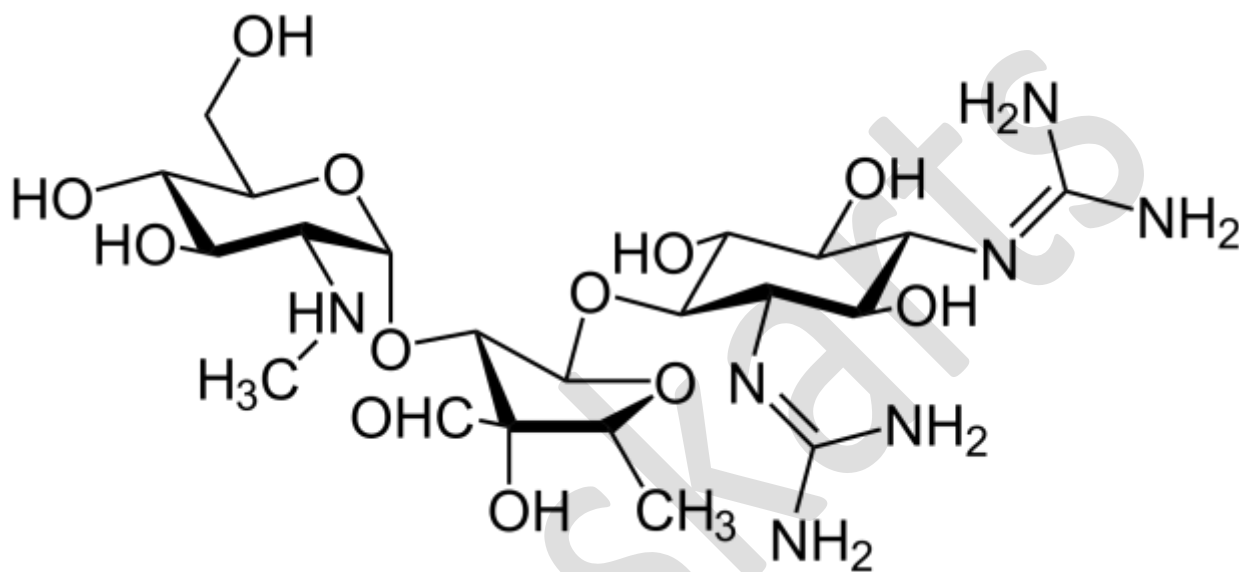
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Streptomycin

Chemical Name:

O-2-deoxy-2-methylamino-A-L-glucopyranosyl-(1 - 2)-O-5-deoxy-3-C-formyl-beta-L-lyxopentano-furanoside

Chemical Structure:



Uses:

- Streptomycin is an antibiotic that is used to treat a variety of bacterial infections, including tuberculosis, tularemia, and plague.
- It is also used to treat infections caused by some gram-negative bacteria, such as E. coli and Salmonella.

Stability and storage Condition:

It is a stable drug that can be stored at room temperature. However, it should be protected from light and moisture.

Type of Formulation:

- Injection
- Oral suspension
- Ophthalmic ointment
- Topical cream

Brand name:

- Plantomycin



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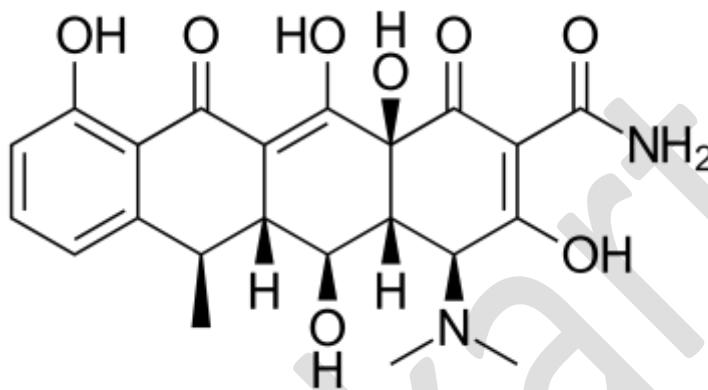
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Tetracyclines:

Doxycycline

Chemical Name: (4S,4aR,5S,5aR,6R,12aS)-4-(dimethylamino)-3,5,10,12,12a-pentahydroxy-6-methyl-1,11-dioxo-1,4,4a,5,5a,6,11,12a-octahydrotetracene-2-carboxamide.

Chemical Structure:



Uses:

Doxycycline is used to treat a wide variety of bacterial infections, including:

- Acne
- Lyme disease
- Malaria
- Rocky Mountain spotted fever
- Typhus

Stability and storage Condition:

- Doxycycline is stable at room temperature. It should be stored in a cool, dry place, away from direct sunlight.

Type of Formulation:

- Capsules
- Tablets

Brand Name:

- Vibramycin-D
- Efracea



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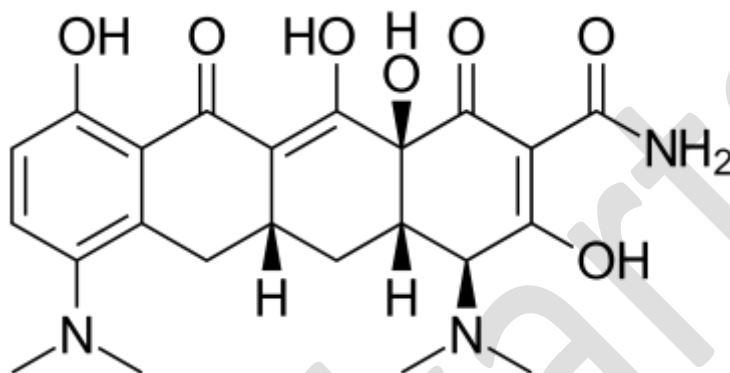
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Minocycline

Chemical Name:

(2E,4S,4aR,5aS,12aR)-2-(Amino-hydroxy-methylidene)-4,7-bis(dimethylamino)-10,11,12a-trihydroxy-4a,5,5a,6-tetrahydro-4H-tetracene-1,3,12-trione

Chemical Structure:



Uses:

Minocycline is used to treat a variety of bacterial infections, including:

- Acne
- Lyme disease
- Gonorrhea
- Syphilis
- Rocky Mountain spotted fever

Stability and storage Condition:

- Minocycline should be stored at room temperature in a cool, dry place. It should be protected from light and moisture.

Type of Formulation:

- Capsules
- Tablets, and an injectable suspension

Brand Name

- Minocin
- Dynacin
- Solodyn



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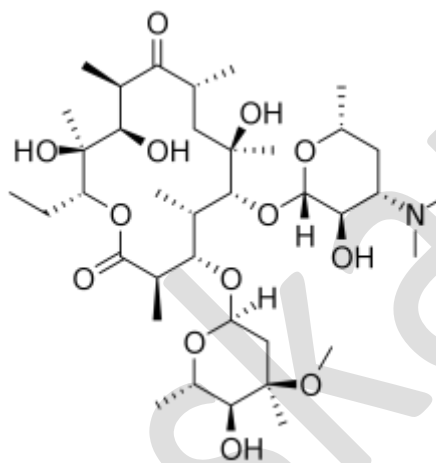
Macrolides:

Erythromycin

Chemical Name:

(3R,4S,5S,6R,7R,9R,11R,12R,13S,14R)-6-[[[(2S,3R,4S,6R)-4-(Dimethylamino)-3-hydroxy-6-methyloxan-2-yl]oxy]-14-ethyl-7,12,13-trihydroxy-4-[[[(2R,4R,5S,6S)-5-hydroxy-4-methoxy-4,6-dimethyloxan-2-yl]oxy]-3,5,7,9,11,13-hexamethyl-1-oxacyclotetradecane-2,10-dione

Chemical Structure:



Uses:

Erythromycin is used to treat a variety of bacterial infections, including:

- Strep throat
- Pneumonia
- Ear infections
- Gonorrhea

Stability and Storage Conditions:

- Erythromycin is a stable medication that can be stored at room temperature. However, it should be kept in a cool, dry place to prevent it from degrading.

Type of Formulation:

- Tablets
- Capsules
- Suspension

Brand Names:

- E-Mycin
- Ery-Tab
- Erythrocin



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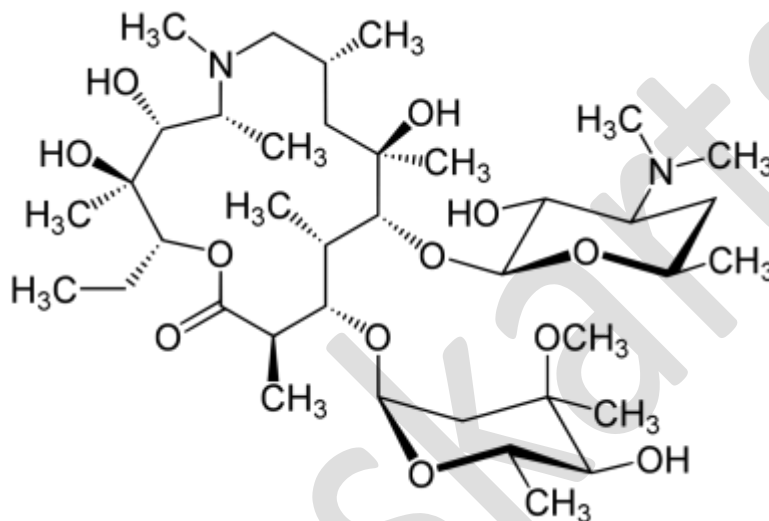
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Azithromycin

Chemical Name:

(2R,3S,4R,5R,8R,10R,11R,12S,13S,14R)-2-ethyl-3,4,10-trihydroxy-3,5,6,8,10,12,14-heptamethyl-15-oxo-11-[[3,4,6-trideoxy-3-(dimethylamino)-β-D-xylo-hexopyranosyl]oxy]-1-oxa-6-azacyclopentadec-13-yl 2,6-dideoxy-3C-methyl-3-O-methyl-α-L-ribo-hexopyranoside

Chemical Structure:



Uses:

Azithromycin is a macrolide antibiotic used to treat a variety of bacterial infections, including:

- Respiratory infections, such as pneumonia, bronchitis, and sinusitis
- Ear infections
- Skin infections

Stability and storage Condition:

- Azithromycin is stable at room temperature. It should be stored in a cool, dry place away from direct sunlight.

Type of Formulation:

- Tablets
- Oral suspension
- Intravenous (IV) infusion

Brand Name

- Zithromax
- Sumamed
- Hemomycin



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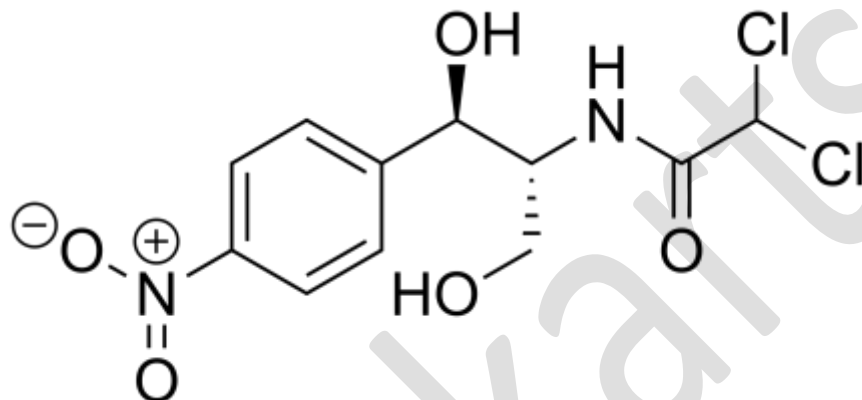
Miscellaneous:

Chloramphenicol*

Chemical Name:

2,2-Dichloro-N-[(1R,2R)-1,3-dihydroxy-1-(4-nitrophenyl)propan-2-yl]acetamide

Chemical Structure:



Uses:

Chloramphenicol is a broad-spectrum antibiotic that is used to treat a variety of bacterial infections, including:

- Meningitis
- Typhoid fever
- Ear infections

Stability and storage Condition:

- Chloramphenicol is stable at room temperature. It should be stored in a cool, dry place, protected from light.

Type of Formulation

- Capsules
- Oral suspension
- Eye drops
- Injection

Brand Name

- Chloromycetin
- Ak-Chlor



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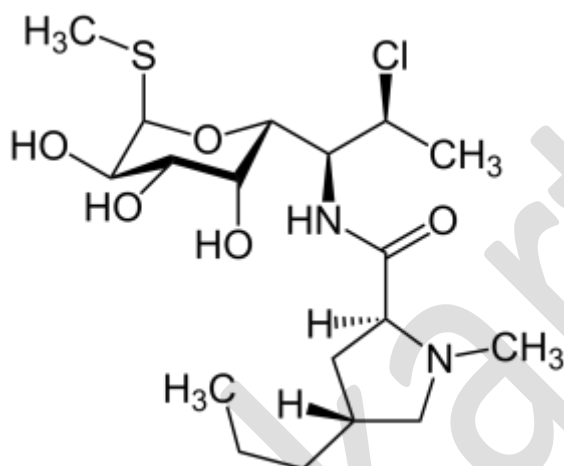
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Clindamycin

Chemical Name:

methyl 7-chloro-6,7,8-trideoxy-6-[[[(4R)-1-methyl-4-propyl-L-prolyl]amino]-1-thio-L-threo- α -D-galactooctopyranoside.

Chemical Structure:



Uses:

Clindamycin is used to treat a variety of bacterial infections, including:

- Skin infections, such as acne and impetigo
- Respiratory infections, such as pneumonia and bronchitis
- Genital infections, such as pelvic inflammatory disease and gonorrhea
- Bone and joint infections

Stability and storage Condition:

- Clindamycin is stable at room temperature for up to 25°C (77°F). It should be stored in a cool, dry place and protected from light.

Type of Formulation:

- Capsules
- Tablets

Brand Name

- Cleocin
- Dalacin

